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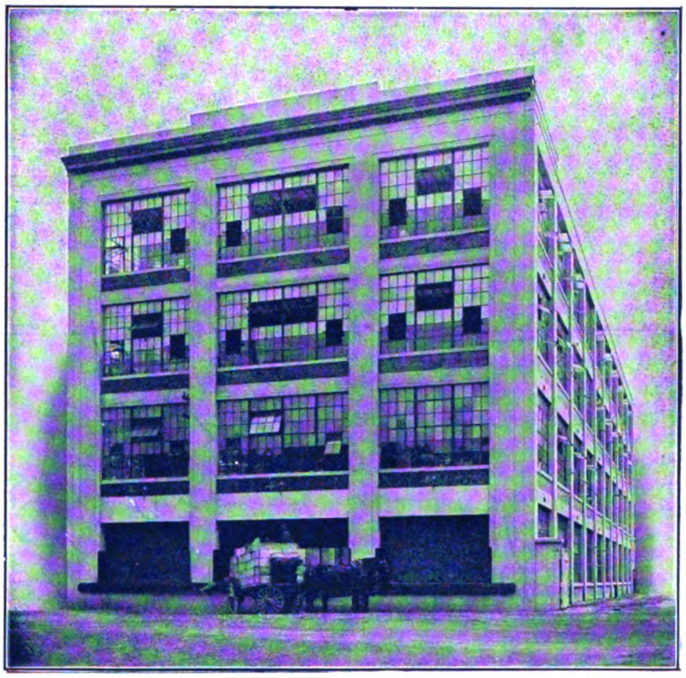
THE NATIONAL FIRESAFE BUILDING PUBLICATION

CONSTRUCTION

WITH A DEPARTMENT DEVOTED TO

SAFE HOMES

JANUARY 1918



VOLUME SIX NUMBER ONE

A JOURNAL FOR ARCHITECTS, PROPERTY-OWNERS, CONTRACTORS, BUILDERS, UNDERWRITERS, FIRE PREVENTION ENGINEERS AND CITY OFFICIALS

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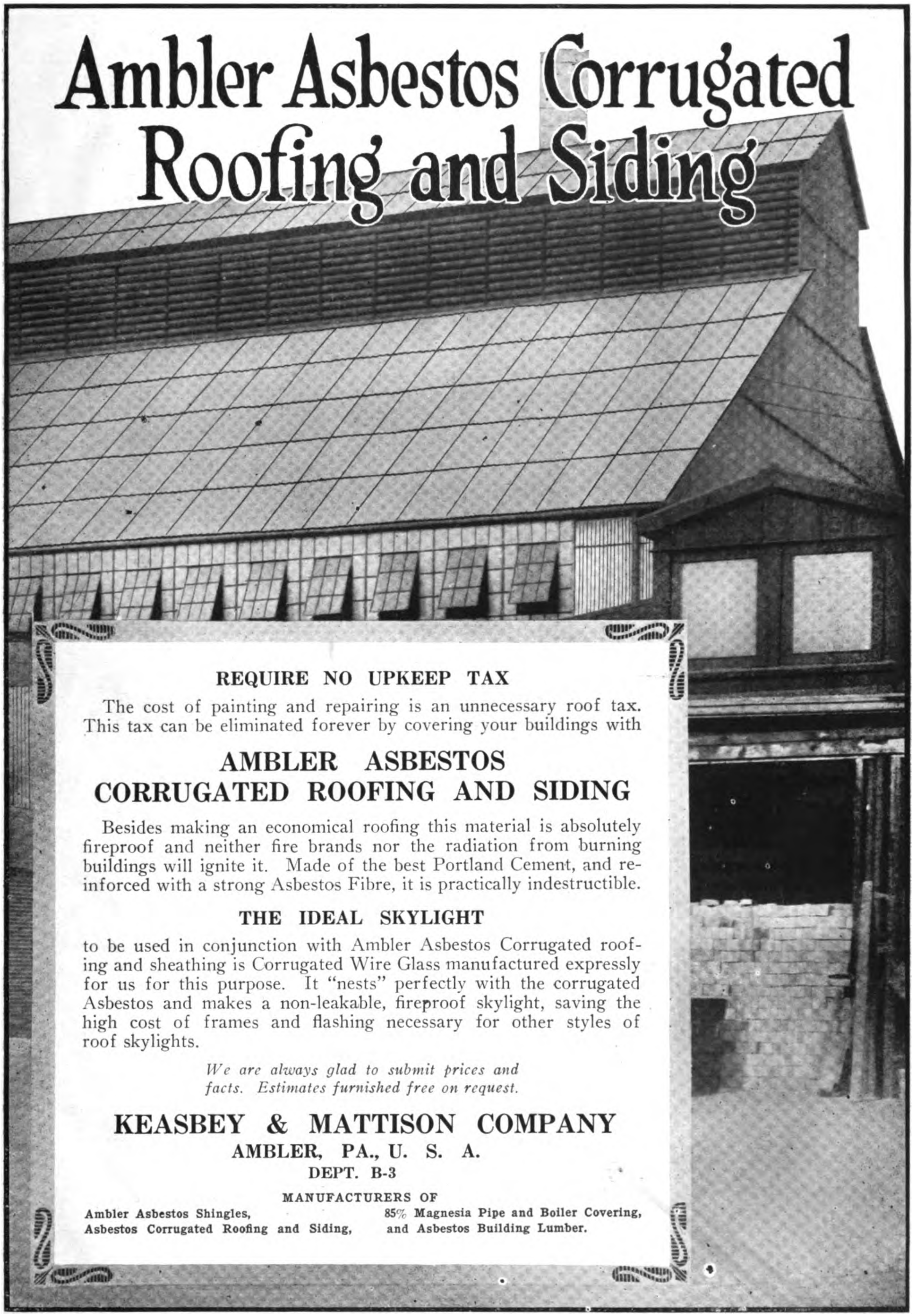

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Reynolds Shingles are the standard asphalt Shingles and you will make no mistake in insisting on Reynolds Shingles.

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ROOFING MATERIAL
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ISSUE No. 118

If your dealer cannot supply you write the factory.
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CONSTRUCTION

ADVOCATING THE CONSISTENT USE OF
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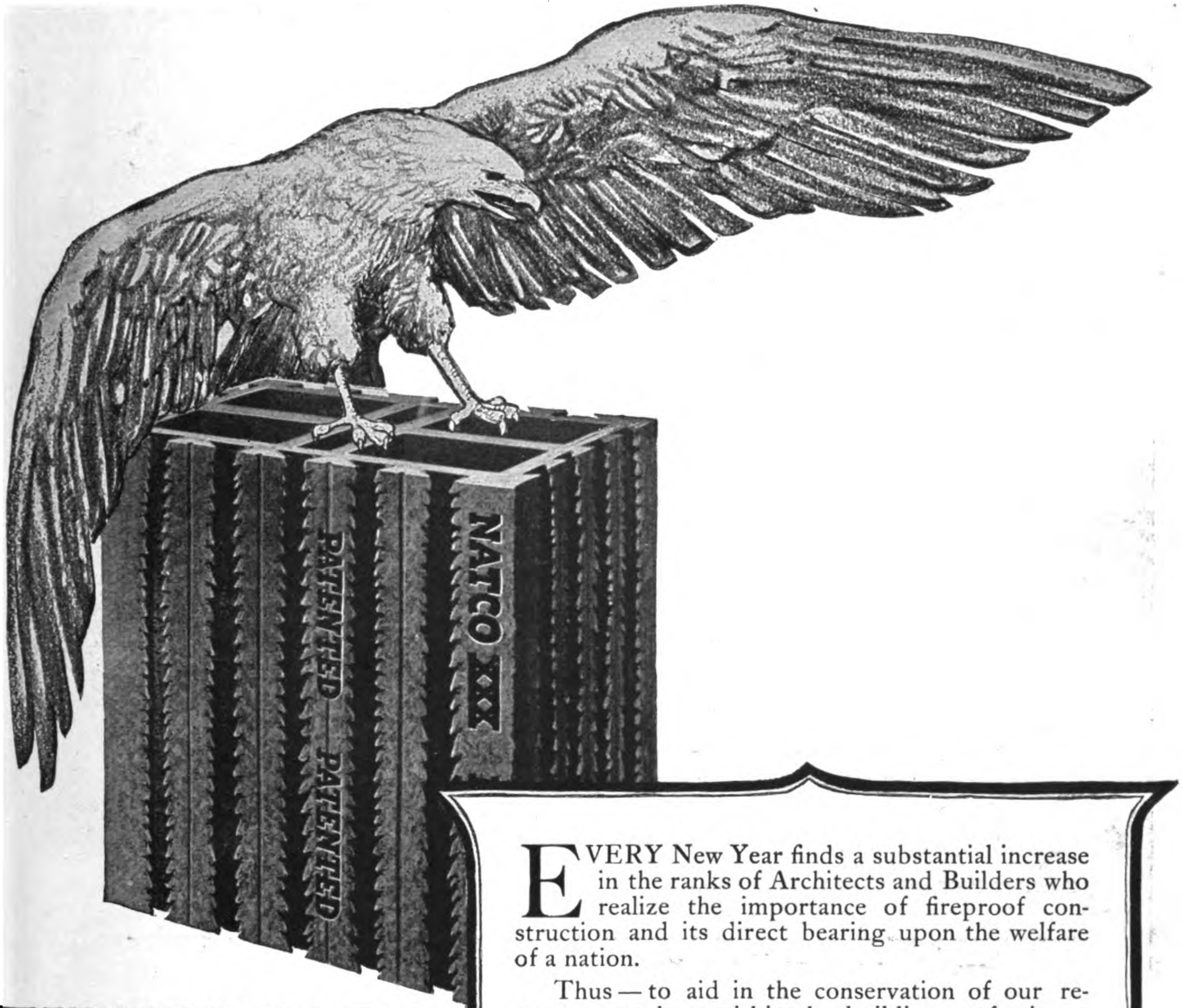

FIREPROOFING A NATION

EVERY New Year finds a substantial increase in the ranks of Architects and Builders who realize the importance of fireproof construction and its direct bearing upon the welfare of a nation.

Thus — to aid in the conservation of our resources, we have within the building profession a force that more than ever should be determined to eliminate the peril at once.

Never before has the necessity of nationwide fireproof construction been so evident as now. A conflagration of any kind is one of the most efficient means of lending aid and comfort to our enemies.

In the home—it would involve an expense that would better serve the country in the form of Liberty Bonds.

In the factory—it may retard the production of machinery and munitions so vital in speeding the satisfactory conclusion of this gigantic struggle.

On the farm—it may decrease the already inadequate food supply of the nation.

Therefore, to curb the fire menace, fireproof construction should be enlarged rather than curtailed.

The necessary war time building economies are readily effected through the use of NATCO Hollow Tile as a building material. NATCO'S big units lay up rapidly in a wall — it is damp proof, vermin proof and weather proof. Used consistently it is absolutely fireproof.

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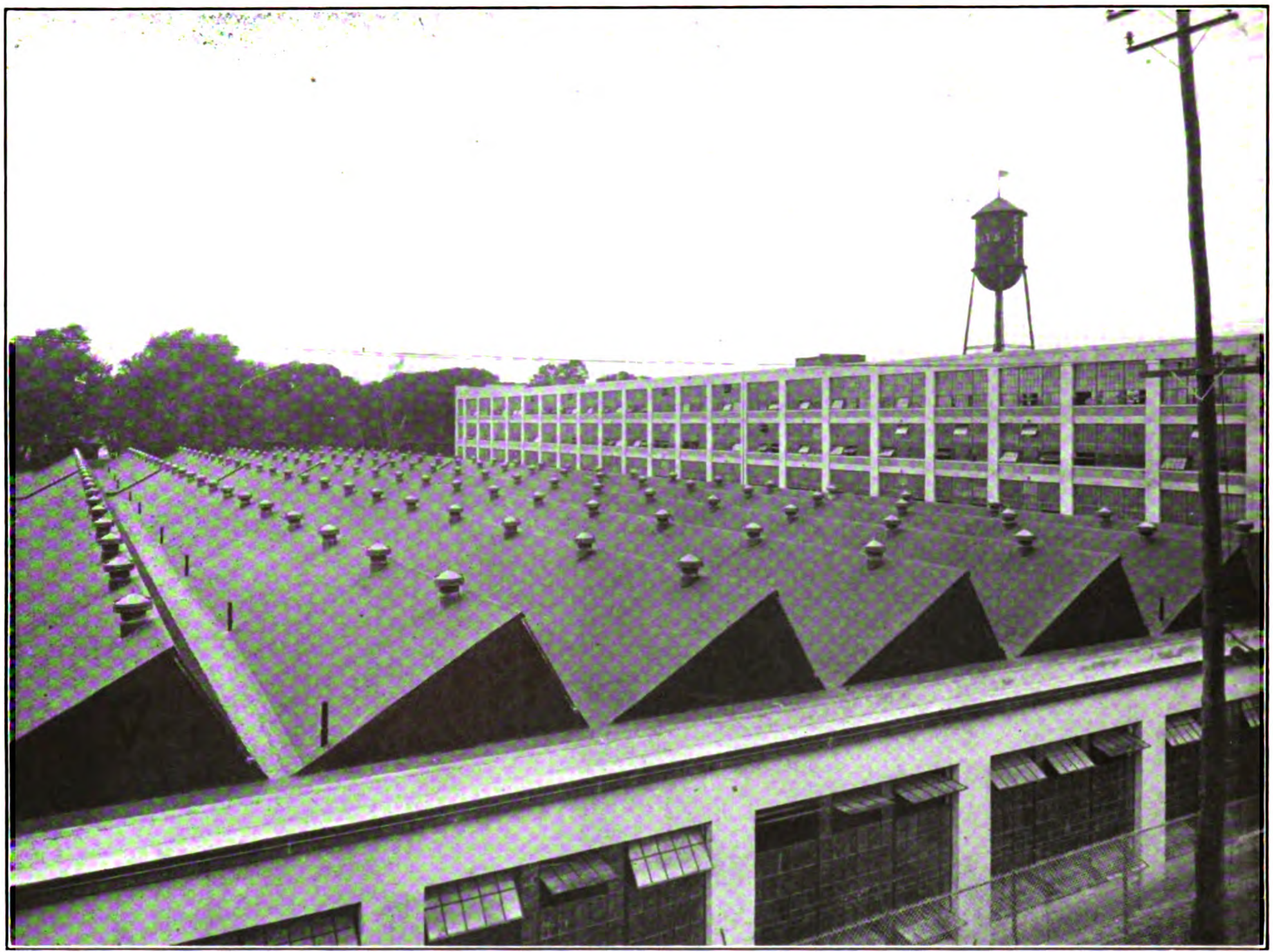

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ADVOCATING THE CONSISTENT VSE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

Vol. VI JANUARY, 1918 No. 1

$50,000,000 for Housing Industrial Workers

FULLY alive to the need for providing housing accommodations for industrial workers, Congress has appropriated $50,000,000 for the purpose and will likely grant a further like sum within a short time.

The first appropriation is to be used to secure homes for employes of shipyards engaged upon Government work, the bill authorizing the Emergency Fleet Corporation to "purchase, lease, requisition, or condemn any land, houses, buildings, or similar facilities, may construct houses on land it acquires, and sell, lease or exchange these houses, and may make loans on adequate security and for not exceeding ten years to persons, firms, or corporations to build houses for shipyard workers.

"Advocates of the measure laid special emphasis on the necessity for additional houses at Sparrows Point, Md., at Hog Island, near Philadelphia, and at Newport News, Va."

The second $50,000,000 asked for, if allowed, as it probably will, will be devoted to the construction of housing accommodations for employes engaged in important Government work other than shipbuilding.

Unfortunately the Government is not committed to the policy of building houses of masonry construction, but uses frame as well. This is regretable for a variety of reasons, not the least of which is the influence its example will have upon industrial home building at large.

In a thoughtful review of the housing situation the National Housing Association a short time ago, held in part that:

"There is grave danger that without immediate action along the above lines and in the haste by those concerned in war industries to provide accommodations for employees that housing of such unsatisfactory character may be furnished as will fail to attract an adquate and contented force of workers. Moreover, the influence which these housing developments under Government control will exert by way of example either for good or for bad upon the general trend of industrial housing in the United States seems to us a matter of great moment."

The Association strongly urged that great care be exercised in planning the character of industrial houses, asserting that: "There is grave danger that those locally concerned with war industries and even the Government authorities, in their haste to provide accommodations in sufficient numbers, might permit them to be of such a relatively unsatisfactory character as to fall short of their essential purpose; which is nothing less than the insurance of living conditions really good enough to attract and hold a steady, contented and efficient force of workers. England dealing with similar problems has through costly experience been brought to a full realization of the importance of this.

"It is important, if the Government investment in enterprises of this kind is to be protected for the future, that the development should be of such a satisfactory nature as to hold occupants after the war is over. Communities developed along scientific, economic and attractive lines would have this great advantage, not only over temporary housing, but over the type of quick-selling commercial developments erected by the ordinary speculative builder."

There is no subject of greater interest before the building fraternity or large manufacturers today than the proper housing of industrial employes, for it is vital that our vast army of workers be settled in homes that are fire-safe, attractive and conveniently arranged, if they are to be kept contented and capable of giving forth their best efforts.

Homes of the desired type can best be secured through the use of masonry, a hint that should be constantly emphasized to all having the general problem under consideration.

Safety of Theatre Patrons Assured

IN designing the new Rialto Theatre, of Baltimore, Blank and Zink, architects of the same city, paid especial attention to those features of construction that insure the safety of patrons against the fire menace, and it attendant evil—panic.

The building is of steel and reinforced concrete construction throughout, with fire doors and windows; all doors being equipped with panic bolts. Provision has been made for nearly 30 per cent. more exits than is required by law.

"The electric lighting has been put on dimmers, which insures a gradual turning on of current in either one or the other direction. The usual exits, and safety lights have been installed as well as aisle lights, which illumine the aisles without interfering with picture or other displays. The entire lighting system is under double control, so that in case of one operator becoming disabled the other may be relied upon. Safety and fool-proof switch boards have been installed at both control centers, separate exists from stage and dressing rooms have been provided as well as the usual cross-overs to exits and equipped with all necessary exit lights.

"Projections of walls have been avoided wherever possible.

"Another admirable safety feature employed in the theatre is the fireproofing of all draperies, decorations and hanging."

Altogether the construction of the Rialto Theatre is thoroughly modern, and displays an appreciation upon the part of its owners and designers of the responsibility laid upon them to protect to the utmost the safety and comfort, as well as to provide entertainment for those patronizing the house.

"Tinder Box" Wood Shingle Roofs Must Go

ASIDE from lumber dealers and speculative builders whose chief anxiety is to sell houses before their wearing qualities can be tested, no man of intelligence who has given the matter even superficial study, would seriously advocate the use of wooden shingles as a roof covering.

The opinion of fire underwriters, fire fighters, and others in position to know whereof they speak, is overwhelmingly against the wooden shingle, and this opposition is becoming stronger daily because of the decreasing worth of the shingles now placed upon the market.

Stress is laid by the lumbermen upon the low cost of wood shingles in comparison with the various types of fire resistive roof covering. This fallacy of this argument is dealt with by F. C. Weber, an experienced fireman of Meadville, Pa., in the following terse fashion:

"There must be built up against wooden shingles a solid wall of public sentiment. You must carry the message home to the people and teach them the value of building materials which cannot burn.

"The selection of fire-safe roofing of tile, asbestos shingles, slate or metal is of particular importance in obtaining safety and permanence in the construction of the home.

"It may be said that the abolition of wood shingles in cities is a hopeless undertaking. *It is not.* The life of the wood shingles now sold is short—perhaps not more than eight years. A law forbidding the repairing of wooden roofs rigorously enforced, will relieve the city of the menace of shingles, and the use of fireproof materials imposes no hardship because the difference between the cost of wood and noncombustible roofing is not large—in fact, the reduction of maintenance expenses makes asbestos shingles, slate or anything as good, more economical than any product of the sawmill.

"Thus when the question of more complete protection against fire is presented to the City Council the cost of roofing that will not burn, need not to be taken seriously, for instead of being injured, the man of limited means will be benefited by the rejection of shingles. A roof which costs even 50 to 100 per cent. more, probably will wear fifty years instead of eight or ten years. The saving is well worth while, even if the elimination of the fire peril is not considered."

$5,000,000 for Industrial Home Building

THE full program as now arranged for the construction of homes for employes at the Sparrows Point, Md., plant of the Bethlehem Steel Company, calls for the erection of 1,500 houses, at an aggregate cost of about $5,000,000.

Half-Million Dollar Fire at Buffalo

FIRE from an unknown cause completely destroyed the Forest Avenue station of the International Railway Company at Buffalo, on January 23rd, the total loss being placed at not less than $500,000. A serious delay in securing water with which to fight the flames, was largely responsible for the heavy loss, permitting as it did, the collapse of the old wooden roof, which falling upon the cars stalled in the structure caused their complete destruction. Whether a new station will be built upon the site of the destroyed one, or another location chosen, had not been decided upon at this time of writing.

Colt's Builds Permanent Fire Proof Buildings for Munition Works

WHEN the European war started in 1914 munition factories everywhere sprung into existence and many of these were temporary and cheap structures, intended only for the period of the war. The folly of erecting buildings of this type has been proven by the great number of fires which have started in plants making war supplies and many of the explosions which have completely destroyed entire plants have been caused by fires starting within the plants.

As opposed to this policy of constructing cheap, temporary buildings, the Colt's Patent Fire Arms Mfg. Co., of Hartford, Conn., erected high-grade permanent reinforced concrete buildings, and the Aberthaw Construction Company has been called upon three times to carry out the work of erection.

The first of these structures was the Commercial Building, erected in the spring of 1916, and illustrated in Fig. 1. This is a building 200 by 60 feet, with four stories and ell, and having floor space of 55,500 square feet. Steel sash constitute 60 per cent. of the wall area. At one end of the building on the first floor the steel windows are replaced by the usual type of rolling steel shutters and this arrangement makes for convenience in the shipment of goods. The shipping floor can be seen in the photograph. This building, as well as those described subsequently in this article, were designed by Monks and Johnson, architects and engineers, of Boston.

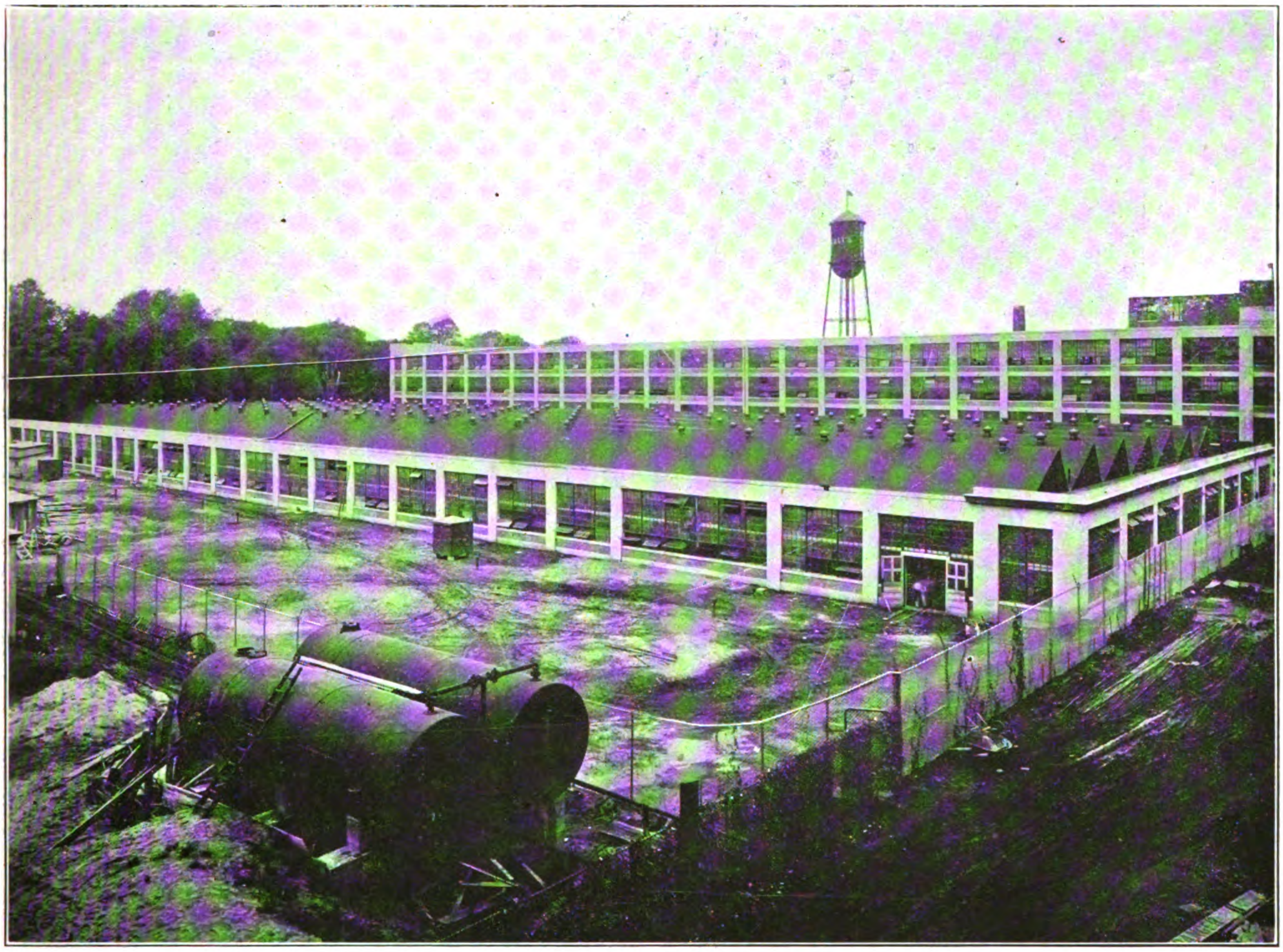


Fig. 1—View of Latest Extension to the Hartford, Conn., Plant of the Colt's Patent Fire Arms Manufacturing Company.
Aberthaw Construction Company—Contracting Engineers

Foundations were begun for the Commercial Building in February and the building was completed in June, 1916.

Military activities necessitated additional facilities and in order to increase their production of United States army revolvers, Aberthaw was called in to construct a four-story building, 490 ft. long by 60 ft. wide with wings at each end approximately 60 ft. square. This building is shown in Fig 3. Since its

First Building Erected for the Colt's Patent Fire Arms Manufacturing Company by the Aberthaw Construction Company, Completed in 1916.

erection two additional stories have been added by the Aberthaw Company.

In this structure the floors are of monolithic flat slab construction 9-inches thick, designed for floor load of 200 lb. per square foot. In preparation for the installation of machinery and piping, the proper inserts for shafting hangers and other necessary harness were provided at the time the floors were poured. At the same time the conduits for the electric wires were embedded in the concrete.

Steel windows cover 36,000 sq. ft., or about 60 per cent. of the entire wall area. This feature together with the unobstructed ceiling areas provides a generous amount of daylight on any part of the floors. See Figs. 3 and 4.

The roof is a solid concrete slab covered with five-ply tar and slag. The walls of the building, both exterior and interior, were given a carborundum rub. For purposes of decoration the panels beneath the large windows were faced with brick.

The Finished Building—A Quarter Mile Around the Walls, About 3 Acres of Floor Space.

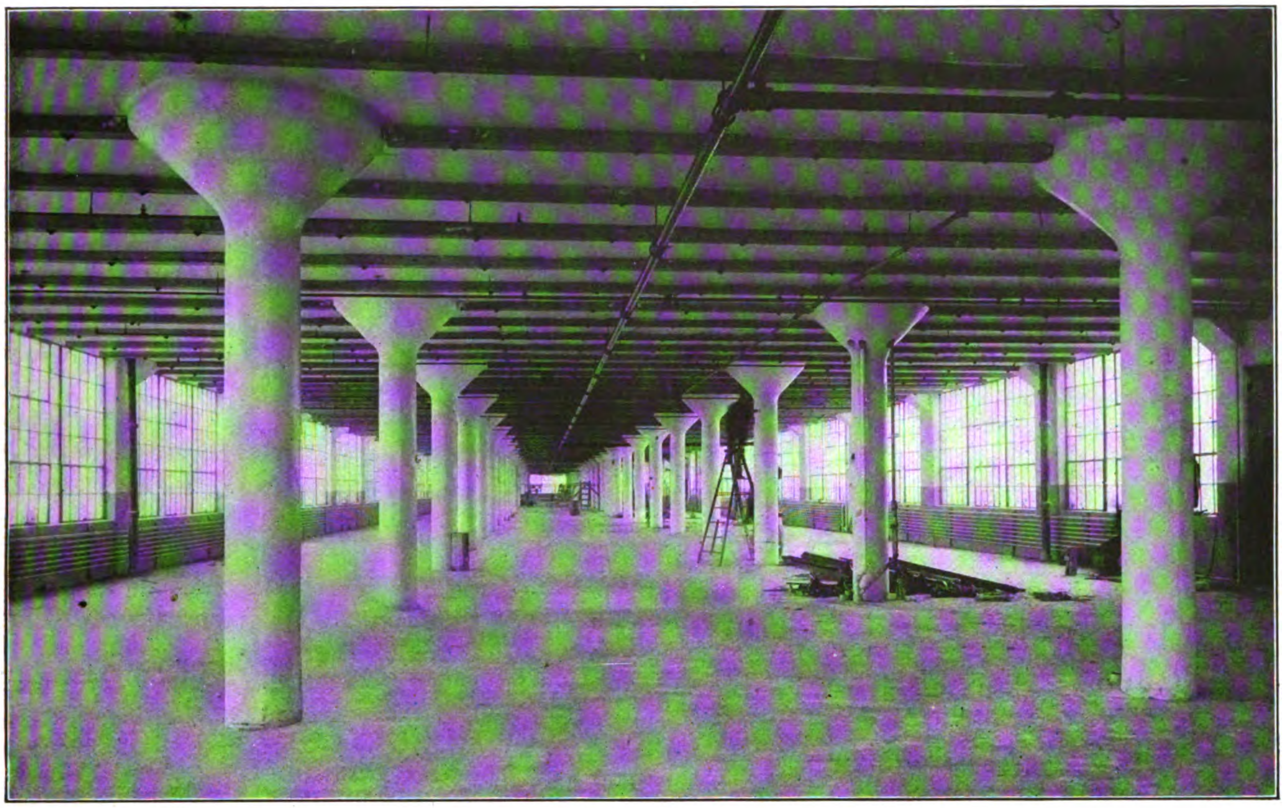


Fig. 4—Interior View Showing Third Floor While Shafting and Machinery Were Being Installed

In this building 17,000 barrels of Portland cement were used exclusive of that required for the Raymond concrete piles. To this amount of cement was added 4,250 cubic yards of sand and 7,500 tons of crushed stone. Five hundred tons of corrugated steel bars varying in size from ⅜ to 1⅛ in. square, were used for reinforcing. The entire building required about 293,000 square feet of wooden formwork. This does not include the columns of the mushroom type cast in Hydraulic Pressed Steel forms.

This building attracted nation-wide publicity on account of the speed with which it was erected, the contractor requiring forty days from foundation to roof. The progress schedule was made up at the beginning of the job and was published broadcast in the magazines by means of circular letters, and notices were posted around the plant so that every workman knew exactly what had to be done and when the job had to be completed.

In addition to this fact, the construction work ran into freezing weather in the late fall, and although this presented additional obstacles it did not hinder the rapid completion of the job.

Four months later, in April, 1917, The Aberthaw Company was called in for the third time for a new building, in this case a one-story building 490 ft. 6 in. long by 260 ft. 6 in. wide, parallel to and joining the former building shows both of these structures, and the sawtooth roof of the more recent building.

In this building are seven bays of sawtooth running lengthwise through the building, columns being spaced 21 ft. by 21 ft. 6 in. apart. The sawtooth framing is structural steel and supported on round steel columns. The walls of the building are brick, about three feet high, with approximately 10,000 square feet of Fenestra steel sash. The sash in the sawtooth are Van Noorden metal windows.

In addition to the above three buildings, the Colt's Company also entrusted to Aberthaw the contract for two additional stories on the building shown in Fig. 3, and one additional story on the building shown in Fig. 2.

The policy of the Colt's Patent Fire Arms Mfg. Co., in erecting permanent fireproof buildings of this kind is certainly commendable. Such buildings can be erected with the utmost speed when undertaken by a large contracting organization and are a permanent asset requiring no repairs or maintenance.

Asbestos Building Lumber

By F. C. Weber

BEING fireproof and not affected by continuous moisture or frost, or subject to deterioration by the elements in any way, it is obvious that asbestos building lumber may be employed freely and confidently in a vast variety of places where ordinary lumber has failed.

Primarily designed to replace the ordinary roof coverings only, its merits have been found to be such that its employment by our best architects and engineers has extended to all classes of work wherein its many desirable qualities have supplanted other materials heretofore commonly in use.

It is perhaps superfluous to an educated person to say that asbestos shingles, slates or sheathing, made wholly of mineral fibre, asbestos and hydraulic cement, are both fireproof and indestructible. Asbestos, or mineral flax, as it is often called, from its peculiarity of crystallizing in fibres instead of ordinary crystals, as is the usual case with mineral materials and hydraulic cement have been known, from earliest times, as among the most refractory of substances. The old Greek and Roman remnants of antiquity, composed largely of hydraulic cement, remain mute witnesses of the everlasting quality of this material.

Asbestos fibre has remained exposed to the elements for unnumbered centuries, without deterioration. Its well-known fireproof quality renders it the most suitable fibre upon which to crystallize the cement deposited thereon in the course of manufacture. It is therefore evident, from the well-known qualities of these two materials, that nothing could have been selected that would have been more fire-proof, indestructible and everlasting than asbestos fibre and hydraulic cement as raw materials from which to prepare a permanent building material such as we have derived through asbestos shingles and asbestos building lumber. Nails may be driven through asbestos shingles and asbestos building lumber by a quick, sharp blow of the hammer, quite close to the edge without danger of fracture, thus differing materially from all other sheathing materials in the important attribute of toughness and homogeneousness.

It is sufficiently elastic to allow of marked tension due to vibration, expansion and contraction of surrounding parts, wind pressure, etc., without cracking or breaking in any manner. The resistance of these shingles to blow, flexion, tensions, etc., is enormous and surprising. These shingles may be punched, filed or worked generally with the greatest ease, with ordinary tools such as are used for working natural slate or wooden shingles. They become very hard, particularly if exposed to the weather or after the lapse of years. One great and desirable feature of them is that they can be successfully jointed, fitted, etc., by the work of ordinary mechanics, no unusual or special knowledge being required in handling them.

They can be used upon nearly every class of structure where there is sufficient pitch of roof for the ordinary use of wooden shingles or natural slates. Architects who are desirous of securing an uneven appearance in the color of the completed roof are specifying that the asbestos-cement shingles be laid haphazard right and wrong side up, which especially in the solid red color makes a very attractive roof.

Saved By Fire Wall

AN admirable example of the effectiveness of a well built fire wall in checking the spread of flame, was afforded during a recent fire upon the Baltimore water front.

The fire in question completely destroyed Pier 9 and the forward end of Pier 8, of the Baltimore and Ohio Railway, and would unquestionably have swept the entire latter pier had not the fire wall interposed. To quote from the "Quarterly," of the National Fire Protection Association: "Pier 8, completed in 1908, was built with concrete piers on piling, the piers supporting steel columns that carried the second floor and roofing. The first floor was supported on piling capped and decked at the floor line 8 ft. above the water. The steel frame was covered with corrugated iron, the roof covering being of composition slag. The floors were of heavy mill construction. The pier was divided into two sections by a reinforced-concrete fire wall projecting 4 ft. above the roof. This fire wall, in addition to affording vantage points for the firemen and tug-boats to fight and retard the progress of the flames as the fire was rapidly spreading toward the land, effectively stopped the fire and saved one-half the pier. The fire protection consisted of 6-in. water pipe, running the whole length of the pier, with sufficient number of fire lines with hose to cover the entire area of the pier, supplemented by numerous barrels of water and buckets."

Durability of Stucco Construction

AN extensive practical investigation is being conducted by the Bureau of Standards of the Federal Government to determine the permanency of stucco as applied to various bases and with different mixtures.

From a progress report recently issued by the engineers in charge of the work, the Associated Metal Lath Manufacturers recently prepared a digest, from which latter we quote in part as follows:

"For the present series of tests, a special structure was erected, approximately 200 feet long, 26 feet wide and 25 feet high above grade; two stories in height, covered with a low hip roof. The exterior walls are divided into panels approximately 10 x 15 feet in size, each panel containing a window, excepting in a few instances where doors are used. In this way 56 panels are provided with various bases for the plaster and various types of mixture. These panels are divided into groups which can be summarized as follows:

Metal Lath	19 panels
Wood Lath, and Wood Lath over Fibre Board	10 panels
Plaster Board	4 panels
Terra Cotta Tile	9 panels
Brick	3 panels
Gypsum Block	3 panels
Monolithic Concrete	6 panels
Miscellaneous	2 panels

"Quoting directly from the official report we read: 'The number of panels in the different groups is proportioned roughly by the probable extent to which similar construction is used throughout the country, although this number is augmented or decreased according to the importance of certain groups or for the purpose of introducing special tests where found desirable. Thus, since metal lath is used most extensively, the first three groups comprise three different types of construction on metal lath as a base, and each having certain advantages. It should be stated, in order to avoid a misconception of the purpose of the tests, that while comparisons between various groups and individual panels are always possible, it has been the sense of the committee that each panel should stand primarily on its own merits as representative of a certain type and method of construction, and its eventual condition and rating should be established without reference to any other panel. Thus the metal panels are, for the most part, made up of painted steel because this class of material is recommended by the lath manufacturers (the uncoated steel is not recommended).'

"Stucco mixtures of various proportions and types were used.

"The plastering of panels was started on October 19 and completed on November 24, 1915. The condition of the test panels has been inspected on three occasions. The first investigation is the result of two independent inspections, 'the first made on April 4th and 5th by Messrs. Bagnall, Early and Humphreys, expert plasterers and members of the Advisory Committee, and the second made on April 6th and 7th by Messrs. Wig, Pearson and Emley of the Bureau.' The second examination of the test panels was made on December 8, 1916, and the third investigation in May, 1917. The report of the third inspection has not been printed at this time, but the earlier ones appear in Technologic Paper No. 70.

"The general plan followed in inspection was as follows: 'First, a superficial examination was made in which the general condition and appearance of the panels was noted; then a close and careful investigation was made immediately after spraying the panels with water.'

Panel No. 15 Receives the Highest Rating

"Of all the 56 panels erected, it is to be noted that Panel No. 15 is the one which has received a rating of 'excellent' in all inspections. An inspection of this panel in May, 1917, by a representative of the Associated Metal Lath Manufacturers, shows that this panel still maintains its perfect rating.

"The construction of Panel No. 15 is metal lath on metal furring, attached directly to studs with lath back-plastered between studs; stucco mixture (parts by weight), 1 cement, 1/10 hydrated lime, 3 sand.

"Quoting from report on this panel, page 29, Technologic Paper No. 70.

"'Superficial inspection: Color, uniform dark gray, no cracks; surface rough, general appearance excellent.

"'Detailed inspection: No cracks; bond good; condition excellent.'

Summary of Results.

"It is interesting to examine in tabular form the ratings of the various types of bases used for plastering. The ratings shown in this summary are based on the Detailed Inspection of Structural Condition, reported in Technologic Paper No. 70.

"Under 'Percentage of Panels Rated Fair or Better,' metal lath is only exceeded by brick and monolithic concrete, which materials, of course, are not comparable to metal lath owing to their greatly increased cost. Metal lath therefore stands first among the popular types of stucco construction. The exceptionally high standard of efficiency of metal lath is apparent in all inspections, as well as in the recent investigation conducted in May, 1917."

American Building Products in China

AN interesting account of the erection at Shanghai, China, of an extensive and thoroughly modern warehouse in the construction of which American building products were extensively used, appears in a late issue of the house organ of the Trussed Concrete Steel Company, of Ohio. The building "is of a reinforced concrete skeleton with brick curtain walls for the outside and plastered Hy-Rib partitions in the interior." While the masonry material was of home manufacture, the "special equipments, as, for instance, steel sash and doors, rolling steel doors and shutters, a freight elevator and so forth, quite naturally had to be obtained from abroad, and this is true also of the reinforcing materials, Rib Bars, Hy-Rib, Steel Lath, which are used in the reinforced concrete structure; also Stonetex and Asepticote which were employed in decorating the building.

"Steel sash is comparatively a novelty for this port, and it speaks highly for the farsightedness of the owner that he wanted nothing but the best, and he is now quite proud of the United steel sash which has been erected. Although merely a relatively low-priced factory type of sash, it has, through correct proportioning, added attractiveness to the facade."

Avaunt, Unsightly Roof Tanks!

AN architect wrote us the following interesting communication:

"I keep your 'Knickerbocker Komments' on my library table, and like to rummage in the back numbers. I recently came across the article protesting against the unsightliness of the roof tanks that mark the sky line of New York.

"To my mind, there is an easy way of avoiding these 'skyscape scars.' Why should it be necessary to have tanks at all? That is, why should the water have to be confined to these overgrown barrels?

"I would build them in the shape of concrete towers, for example. I have in mind a standpipe at a huge reservoir in Brooklyn treated in this manner. It looks like a picturesque mediaeval watch tower, including even the narrow type of 'slit windows' from which ancient archers used to hurl their arrows at ye enemy. To the uninitiated, it does not represent a standpipe at all, but a highly interesting ornament to the landscape.

"I also have a remedy for those who object to this suggestion on the ground of cost. Why not have the roof, or a good part of it, transformed into a reservoir, say 18 to 20 inches deep, filled with water?

"The roof has to be watertight anyhow, and as to the liability of freezing, the heating system of the building can take care of that at little or no expense, since in most cases a lot of live or exhaust steam is streaming skyward anyway.

"I have seen a small structure so treated. In my travels on the Pacific Coast, I came across a concrete store house for picture film negatives. You know how much money is involved in the production of each, also how inflammable this material is.

"To guard against fire danger, there is a 'hair trigger' sprinkling arrangement, connected with the 'tank roof' extending over the entire building."—"Knickerbocker Komments."

Frame Construction With Stucco Exterior

AN initial contract for the erection of industrial houses to accommodate fifty-two families was recently awarded by the Economical Homes Association of Elizabeth, N. J., to the M. Byrnes Building Company, of the same city. The houses and the general arrangement of the grounds about them were designed by the architectual firm of Murphy and Dana, of New York City, who have devoted considerable attention to industrial home building, and are responsible for the construction of a number of such properties in various parts of the country.

The houses at Elizabeth are to be of frame construction with stucco on Clinton wire cloth as exterior covering. While most of the homes will have four rooms each, some will have five rooms. "These are the last word in compactness of arrangement for a four-room scheme. The kitchen, where the family will gather most, during the evenings, is made considerably larger than the parlor; while special features of the latter, commending these houses strongly to a number who have seen the plans, are the addition of a closet, and the closing off of the foot of the stairway—both of which variations from the ordinary make the parlor much more serviceable as a bedroom.

"In this connection, critics should remember, that where there can be only two bedrooms in the second story, the parlor will in any case, be used for sleeping purposes whenever there are grown children of both sexes; everything possible should therefore be done to make it as comfortable as possible for this double use, while detracting as little as possible from the attractiveness of the room as a parlor.

"The monthly rentals of these houses will run from $16 to $26 per family."

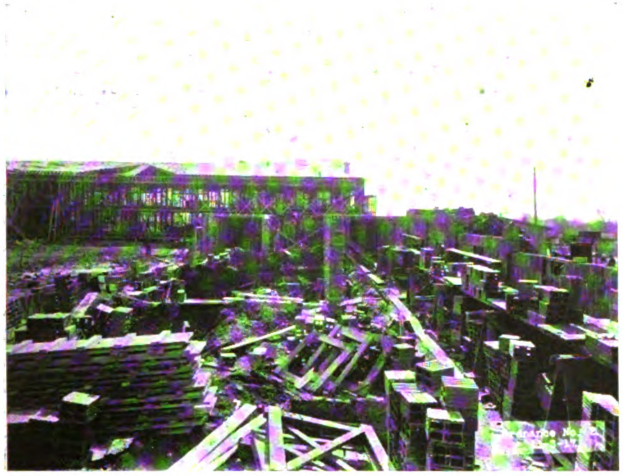
A Long Way Toward Conserving the Natural Resources of the Country Would be Taken if Firesafe Building Were Made Compulsory.

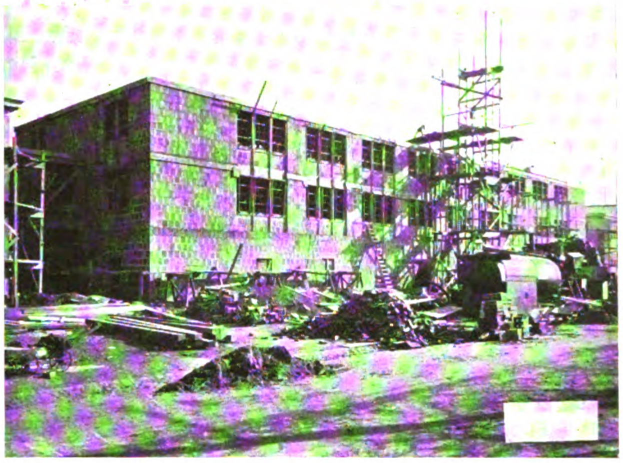
Record in Rapid Building Construction

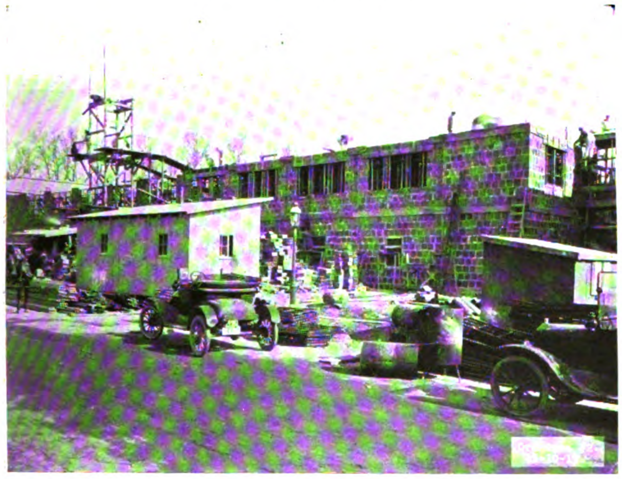
IN these strenuous days we have become accustomed to hearing of rapid work in building construction, the demands of the Federal Government calling for expedition in this respect to a degree unthought of in normal times.

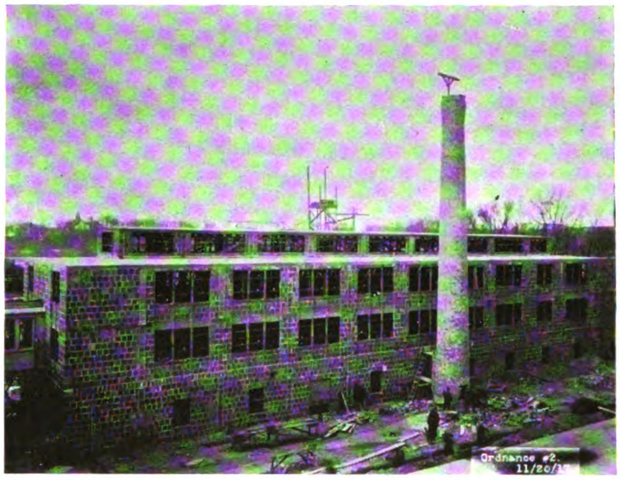
Noteworthy in regard to time element among the numerous structures erected for war purposes during recent months, is a Government ordnance building, completed at Washington, D. C., on November 20 last.

The structure in question is of hollow tile construction, the material for which was supplied and the work of erection conducted entirely by the National Fire Proofing Company. Starting on the 3rd of November the work was completed just seventeen days later, the progress attained during intervening periods, as well as the start and finish being shown in the accompanying illustrations. The building as it stands is "fireproof, weatherproof and durable."


On November 3rd


At the End of 2 Weeks


One Week Later



November 20—Fireproofing Complete

The Architect in France

IT is unusual for a house, however small, to be erected in France without the service of an architect, who not only draws the plans, but actually superintends the work, says an exchange. Usually it is he who orders the building material and assures himself that its quality is up to requirements.

The contractor and his workmen perform their duties in conformity with architect's orders, and the latter, who is usually a man of capital, advances the funds required in order that the contractor need not wait for payment until the building is completed.

Moreovover, the French law imposes on the architect a serious responsibility, since he, as well as the contractor, is responsible for all defects of construction during a period of ten years.

Uniform Regulations for Elevators

UNDER the direction of the Elevator Manufacturers' Association of the United States, a code of uniform regulations for the construction and installation of both passenger and freight elevators has been prepared.

After defining the various types of elevators and their respective uses; the proper method of constructing the cars and their approaches and appurtances, the subject of shafting erection is dealt with. Upon this latter subject we quote from the Regulations as follows:

Enclosures Around Elevator Shaftways, in General.

a. The shaftways of all elevators shall be enclosed throughout their height with walls of brick or terra cotta, or wire lath and plaster, or wired glass set in metal frames or other fire-resisting construction, except (1) elevators serving only two adjacent stories; (2) elevators within the wellways of surrounding stairs; (3) elevators of carriage type and of hatchway type; (4) elevators outside of buildings; and (5) that part of a dumb-waiter shaftway located between the floor and a counter-top.

(The details of construction, thickness of walls, thickness, size and method of setting wired glass, etc., shall conform to the local building requirements. All sash shall be stationary unless in the outer wall of the building. Frames and sash in the outer wall of the building may be of wood and the sash glazed with common glass if not conflicting with the local building requirements. Two or more elevators or dumb-waiters may be installed in the same shaftway without partitions between them.)

b. Elevator machine rooms, open to shaftways enclosed with fire-resisting construction, shall be similarly enclosed, except in the shaftway side.

(An elevator machine room shall be considered as open to the shaftway unless separated therefrom by a partition or door of 3-16 in. steel or iron plate, or by a partition or door of fire-resisting construction, such partition or door being cut out only for cables and machinery and fitting closely around such cables and machinery.)

c. Fire-resisting shaftway enclosures shall be extended through and at least 3 ft. 0 in. above the roof if the elevator serves the top story of the building, except in the case of a dumb-waiter shaftway terminating under a counter-top, and except where a solid platform is located under the machinery and sheaves at the top of the shaftway entirely blocking it except for the openings for cables.

d. Where the fire-resisting shaftway enclosures are not required to continue through the roof, the top of the shaftway shall be of the same fire-resisting construction as required for the walls. (See Regulation 51*a*.)

e. If the fire-resisting shaftway enclosure continues through the roof, a skylight or skylights shall be located in the top of the shaftway, or a window or windows shall be located in the side walls of the enclosure at the top unless there is a solid platform at the top of the shaftway entirely blocking it except for openings for cables, etc. The total glass area of such skylights or windows shall be in each case (1) not less than one-half the area of the shaftway; (2) not less than three square feet if the area of the shaftway is three square feet or more; and (3) the full area of the shaftway if the latter is less than three square feet.

(The object of the skylights and the windows is to provide a vent for smoke and hot gases in case of fire; consequently, the glass in the skylights and windows must be plain glass, not wired glass, or the skylights and windows must be arranged to open automatically to the required area by the fusing of fusible links inside of the shaftway near the top, in which case wired glass may be used. If plain glass is used in a skylight, the skylight shall be protected by a galvanized iron or steel netting of not more than 1 in. mesh, made of not less than No. 12 gauge wire, supported on metal supports not less than 6 in. above the skylight, in order to prevent breakage by debris from an adjacent fire.)

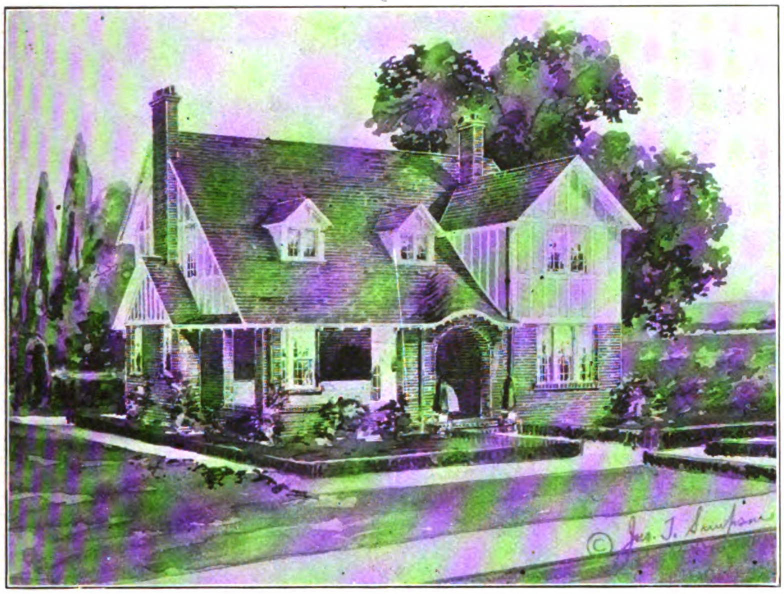
f. If there is a solid platform under the machinery and sheaves (see Regulation 5) at the top of the shaftway entirely blocking it except for the openings for cables, etc., windows of construction and as nearly as possible the area specified in Regulation 51*e* shall be installed in the shaftway immediately below such solid floor, and either in the outside wall of the building or above the roof.

(If there is no outside wall forming the shaftway and if the solid floor in the shaftway is not above the roof, no vent, skylights or windows will be required. Vent windows above the roof and below the solid floor in the shaftway need not be located so close to the roof as to interfere with roof flashing.)

As Cheap as Frame Houses and Far More Desirable

ECONOMY in initial cost is the argument most insistently advanced by advocates of the use of wood in home building: a consideration in the minds of the lumbermen and their followers that should outweigh every other with the prospective builder.

The rapid increase in the cost of lumber, however, has robbed it of its former proper claim to "cheapness," and today a residence of masonry construction can be erected as artistically, comfortably and far more substantially at as low initial cost as that built of frame. Facts and figures to prove this assertion have been given in the pages of CONSTRUCTION for months past, and we confidently look forward to the time when no sensible property-owner will think of erecting a home unless it be constructed of materials that will insure safety from fire, and the constant need for repairs, a condition inseparable from the frame built structure if it be preserved in livable condition.



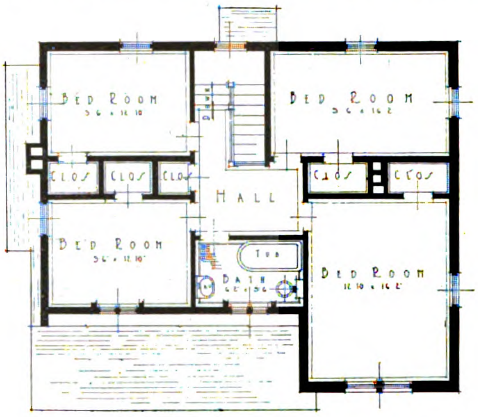
An Attractive Home for City or Suburb. Desirable Features Include the Covered Porch, Well Arranged and Commodious Living and Dining Rooms, and Upon the Second Floor Three Large Bed Rooms, One Centrally Located Hall and Bath Room—Can Be Built for $6,500

An apostle of fire-safe home building and a man who has proven again and again during the past nine years the wisdom of what has been stated above is John T. Simpson, architect and engineer, of Newark, N. J., a fair example of whose work is illustrated upon this and succeeding pages of CONSTRUCTION.

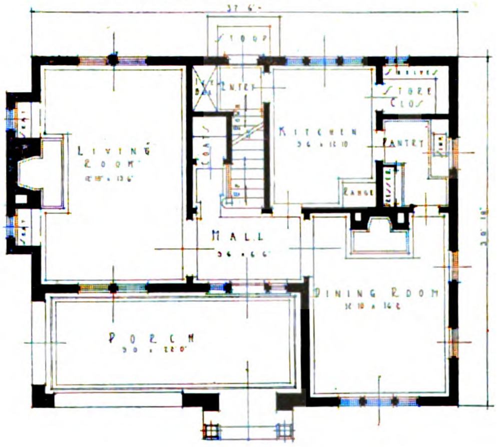
A number of years ago when there was much talk of the low-cost concrete house, Mr. Simpson set for himself the task of producing a house that would not only be low in cost but would be artistic in appearance, so devised that the exterior might be varied at will without increasing the cost. A house that would contain all the elements of comfort—dry in any weather, warm in winter and cool in summer; safe from the risk of loss by fire and in which the upkeep would be reduced to a minimum. After considerable thought he selected concrete as the material with which to construct the house, being largely influenced by the fact that in many sections of the country sand and gravel are plentiful—in fact can often be dug from the cellar of the house itself.

Use of Forms Eliminated

After selecting the materials the next question was the method of applying it. Mr. Simpson's experience with concrete industrial buildings and schools had convinced him that there was a great waste in both labor and materials in the use of forms for receiving and holding the concrete in place until it hardened or set. He experimented with many types of forms, both wood and metal, and finally came to the conclusion that the elimination of the form would go a long way toward solving the problem. One of the reasons that led to the decision was the fact that in casting concrete in



SECOND FLOOR PLAN



FIRST FLOOR PLAN

forms much material was used that gave no actual service, hence was wasted.

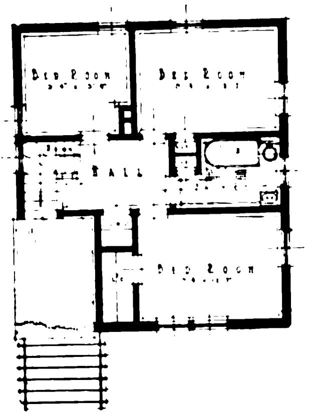
The result of further experiment was the production of a system of pre-cast reinforced concrete of standard sections that could be cheaply produced and in which all the parts could be designed for the actual service they performed, thus putting the strength where needed and eliminating waste.

The assembling of the parts at the site is very simple and quickly done. The entire work may be done by common labor and a house erected in a day.

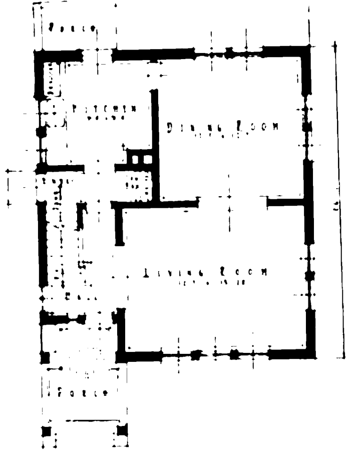
Made in Standard Moulds

Simpson Craft Homes, as the construction is called, consists in making floor beams and slabs, window sills and lintels, wall slabs, partition studs, stair, chimneys, mantels, porches, and even the shingles for the roof, in standard moulds, in a shop where most of the surfaces may be finished with straight edge or wood float on convenient benches, during weather that would be impossible to erect buildings, and later transported to the site of the new buildings.

Another $6,500 House Constructed Throughout With Fire Safe Materials, and an Incombustible Roof. All Rooms Are of Ample Size and Well Lighted, While the Bed Rooms Are Equipped With Plenty of Closet Space



SECOND FLOOR PLAN



FIRST FLOOR PLAN

After the cellar has been dug a footing course of concrete eight inches in thickness and twenty inches wide is laid for the outer walls of the building, and upon this is set up channel-shaped field forms at three feet four inch intervals, and against these is placed the edges of the wall slabs, ends of lintels, sills, floor beams, window and door frames. A similar channel section, somewhat greater in depth, is then placed on the inside of the building directly back of the one on the exterior, thus forming a pocket for a small column or stud.

When all stud forms and sections have been put in place up to the under side of the roof and the reinforcing steel rods have been placed in the studs, concrete is poured into these pockets, which extend all the way from the footings to the roof. As they become filled the concrete settles around the ends of the sections projecting into the pockets and firmly imbeds and secures them.

Damp Proofing the Walls

One of the heretofore unsolved problems of the dwellings built of reinforced concrete was economical damp-proofing of the outside walls. Experience has shown that any masonry that extends from the outer to the inner surface of the walls will sweat in cold weather, even if made impervious to rain. To overcome these defects and at the same time add warmth to dryness, the Simpson Craft method provides on the inside face of the wall studs small wire "hairpins" spaced six inches on centers and over the ends of these are forced sheets of heavy, waterproof roofing felt lapped well at all joints and tightly secured to all door and window frames. When the paper is in place a metal lath with heavy outstanding ribs is forced over the ends of the "hairpins" and a small wire is threaded through the loop of the "hairpins," after which the loops are tightly twisted, locking both paper and lath to the studs. The walls are then ready for plastering.

The slabs for the exterior walls are but one inch in thickness, about the same thickness as stucco on an ordinary building, though made of much higher grade materials, and as the studs are seven inches wide across the wall it will be seen that a large air space is provided between the studs. As the paper is placed flat against the inner face of the studs and the rib on the lath is nearly an inch in depth, another air space of that depth is provided between the plaster and the paper, and this air space extends entirely around the building, effectually cutting off the exterior from the interior face of the wall, damp-proofing, frost-proofing, sound-proofing and effectively insulating the walls.

When the concrete forming wall is mixed 5 per cent. of hydrated lime is added to the cement. This not only makes the concrete flow more smoothly and gives a finer surface treatment, but at the same time waterproofs the concrete. In the standard construction all parts of the exterior walls are finished under a wood float, althought this may be varied in many ways for pleasing surfaces. When the surface has been finished, and has had time to thoroughly dry out the entire exterior surface is gone over with cement stain in selected colors, and a pleasing and permanent surface obtained.

The ease with which stairs are built is the most surprising part of the system. The treads and risers are cast in one piece, of concrete and placed on rough supports until after the studs adjacent have been poured, forming the wall and face strings and at the same time building in the ends of the treads and risers. Where stair railings are desired they are also precast, set up and built in during the above process.

Chimney Construction

One of the most simple things to build is a chimney. These are made in sections twelve inches high and are as simple to erect as placing boxes on top of each other. A special smokeproof joint guards against gases leaking into the house, and clay flue lining is built into those sections coming near the fire. Mantels and open fireplaces are constructed in similar manner, the latter lined with brick and having brick or tile hearths.

The finished floors of the standard houses are cement with wooden carpet strip and sanitary cove base. The floors, however, may be of wood, composition or any material desired. In adopting cement finish the inventor of the system followed the example set by the high-grade hotels and office buildings, where cement finish is almost universally used.

Inflammable Roof Covering

The roof covering may be of any material such as slate, slate-coated asphalt shingles, asbestos shingles or terra cotta tile. The standard construction is colored cement shingles, which are particularly low in cost and beautiful in appearance and permanent.

Porches and pergolas are all pre-cast in the shop and set up in the field. Flower boxes may be attached to the side of the building or on the porches or lawns. Seats for porches and lawns are quickly and artistically produced at very low cost. Clothes poles, stepping stones, etc., may also be produced.

As the walls, partitions and floors are hollow, plumbing is easily applied.

Electric lights in metal conduits are a part of the standard equipment.

A large, well-built, and serviceable range is in stalled in the kitchen of the houses in such a manner that when the cooking of the meal is over and while the fire is still hot the heat usually wasted can be diverted by means of a specially invented system of ducts and dampers into each and every room of the house, positively warming any or all rooms desired.

In addition to heating the house, the rooms are all thoroughly ventilated and none but pure, fresh air is introduced into the rooms. The odors from the cooking do not reach the other rooms. As the bedrooms are ventilated through the clothes closets, all clothing is thoroughly dried and odors removed. The system that furnished warm fresh air in the winter for the room will remove the warm air from the rooms in the summer, causing a flow of fresh air from without and all at the expense of only one firepot in the entire house. Even the waste heat from the hot water boiler is conserved and used, a most important feature in these days of high-priced fuel.

Stands the Test of Time

The first experimental house was built about four years ago at New Durham, N. J. The parts were made out of the waste from a stone-crushing plant and hauled to the site. In this particular house the inside of the walls and partitions are also of slabs and were made at the quarry, fully finished, and set up at the site. The only treatment given the inside surface was washable paint. The building is standing today without a single crack and the interior is washed down twice a year and looks as bright and clean as when first finished.

Eight houses were also built at St. Johns, Quebec, the work being carried out in the winter, some of the houses being erected when the temperature was 30 degrees below zero.

Twenty-four houses, are now being erected on this method, which is protected by patents, at Manheim, W. Va.; Martin's Creek, Lansford and Nesquehoning, Pa.

The Electric Fire Hazard

By Thomas H. Day

THE foreman who is not an electrician but who would yet like to lend casual advice in electrical inspection, as far as he may reasonably do so, naturally desires to know what should be in the mind of an inspector when endeavoring to safeguard the electrical fire hazard. With the experience gained, it has been found difficult to entirely separate the electrical fire hazard from the electrical life hazards, as, in many instances, defective electrical equipments and installations, which may contribute to one hazard and make possible a fire, will also injure life and limb without causing a fire. So, in field practice, we not alone safeguard property against the electrical fire hazard, but also protect life and limb, even though no fire should result.

How are electrical fires caused? What are the physical evidences of a possible fire? How may the defects be recognized? These are natural and logical questions.

Virtually the whole question of safety lies in adequate conductivity and efficient insulation, as fires by electricity all occur in one or both of two general ways.

First. By the overheating of conductors, wires, switches and other devices. This may result in a fire to surrounding inflammable material or objects. Overheated wires will ignite their own insulating coverings and the flame will travel along the conductors igniting any other inflammable object in its path. That this overheating may be avoided we should examine very closely the types and sizes of fuses used. The old-fashioned link, or wire fuses, should never be permitted unless enclosed in cabinets of proper construction, except on switchboards in rooms of fire-resisting construction. The fuse wire fuses should never be permitted because of the absence of the copper terminal. Fuses of any type should never be installed in locations where there are flyings of ignitable material, dust or gases, as, even with enclosed fuses, the gases formed by the fusing metal, in the fuse, disrupts the fuse casing and the arc, also the molten metal will ignite and cause fire.

A circuit is properly protected by fuses when it is first installed. Later the number of lamps may be increased or the motor replaced by a larger one. When the increased load is started, the fuses "blow" and open the circuit—just what they are designed to do. An irresponsible party (more often the responsible party) then increases the size of the fuses, or worse yet, he substitutes a copper wire, a hair pin, strips of iron, brass or lead, in the fuse block. The lights burn apparently well, or the motor runs satisfactorily and the man or boy now believes he is as good an electrician as the average one. Later, however, the wires overheat and the insulating covering is ignited, setting fire to surrounding objects.

Inspectors should, therefore, become familiar with the safe fusing of wires, as the capacity of standard fuses are plainly marked on the outside. The smallest wire permitted in any circuit and the one most generally used on lighting circuits, is No. 14 B. & S. gauge and this size wire should never be fused with a fuse larger than fifteen amperes for a motor circuit nor larger than ten amperes for a lighting circuit.

Another defect which may cause the wires to heat, is that of a poor joint or splice in a wire. When a small amount of current flows, the heat is appreciable, but as the current increases, owing to the poor contact the joint heats and the insulation is ignited. All splices should be well made and should be mechanically and electrically secured before soldering, that the danger of heating, at the splice, will be removed. This overheating may occur without overloading the circuit, simply from poor connections. For an example, a binding screw is set securely, but, owing to the vibration of the building this contact becomes loose, heating takes place and the insulation on the wire is ignited because of the heated conductor.

Second. Fires are caused by the forming of an arc. An arc is always accompanied by heat, and if it is of sufficient capacity may not only ignite combustible material, but may melt metals. Arcs may be formed between the two wires of a circuit when the wires are too close to each other. Unless wires are installed in conduit, armored cables or raceways, they should never be less than two and one-half inches apart, on exposed work, for systems not above 300 volts and four inches for systems between 301 and 550 volts.

An arc may be formed between one wire of a circuit and any grounded metal. Assuming it is impossible to choose another run for the wires and that it is also impossible to remove the grounded metal, the use of an insulating, non-absorptive bushing secured to the wire, at the point where it is close to the grounded metal is required. An arc may also be established between an ungrounded metal and another grounded metal, the former being in contact with a wire of a circuit. An arc might be formed at the place of poor contact, and if a sufficient amount of current is flowing, the gas pipe might be punctured and the escaping gas ignited by the arc.

As a general precaution, all wires should be considered as bare, and should be so supported that if bare they cannot come in contact with anything other than their designed supports.

Opportunities for Architects

(From the "Forum")

WHAT is the trouble with architecture as a profession in these troublous times? Up to last April architects were a hard-working and generally respected set of citizens, who voted conservatively, paid their taxes with a good grace, gave rather more liberally of their time for schemes of improvement than did the average citizen, and complacently regarded themselves as useful members of society and worthy of at least reasonable consideration in any time of emergency. But how these innocent ideas have gone glimmering in the past nine months! Although scores of architects of the highest standing offered their office organizations and personal services complete to the Government in the early stages of the war when the great National Army cantonments were being projected, not one offer was accepted, and the construction of these buildings was entrusted to hastily gathered organizations of engineers and landscape architects, working under or with the general direction of the Quartermaster Generals' office, itself a force crude in ideas and hastily expanded to many times its normal size. It has not yet been shown what the country gained by thus summarily dispensing with the services of architects of long experience, and assuming offhand that their training and habits of thought would be useless in such an emergency.

Amazing Suggestion by the President

Following this humiliating snub the profession was given another jolt by the President's amazing request that all construction work be abandoned until the close of the war. This request, which as a matter of fact amounted to an order, put architects and contractors in the same class with brewers and saloon-keepers, whose business was undesirable and whose maintenance was unnecessary, and implied that as far as serving the country was concerned, while the younger men might assist as bomb-throwers or at best as members of the camouflage corps, those beyond military age had better be knocked on the head after their capacity for paying "excess profit" taxes and buying Liberty Bond had been exhausted. The Government apparently has not stopped to consider that in Germany work on many great public construction operations such as the Berlin subway, for example, has been going on constantly during the war, and even in long-suffering France such a costly operation as the Marseilles Ship Canal has not suffered a moment's delay during the war period. The present pessimism of the Government, which seems to amount almost to a panic, has probably resulted in a worse dislocation of business in the United States than has occurred even in some of the invaded countries.

These remarks are not made in criticism of the Government, but are statements of fact as they must be interpreted by architects. It is realized by every member of the profession that the country was called upon to meet an emergency for which it was not fully prepared, and in the stress of hastily assembling organizations to direct huge undertakings, it was inevitable that offers of valuable service would be overlooked. But what still remains difficult to comprehend is why after there has been ample opportunity to judge relative values, the same conditions should be allowed to exist.

Work That Can Be Done

What can architects do to save what remains of their business and perhaps build up their professional influence to its former position? Many important Government projects remain to be carried out, although the land is covered with the engineering abortions of the summer's haste and waste policy from which only the contractors profited. Great operations are proposed for housing the workers at the shipyards and munition plants. The projectors of these enormous plants, not stopping to investigate the experience of England, seemed to suppose that workmen would be content to live for months or years in bunk houses away from their families and far from diversion of any sort. Only now is it beginning to dawn upon them—thanks to the unremitting labors of some members of the Council of National Defense—that even to ensure their health, decent sanitary conditions of space and drainage are essential; while to avoid the fearfully costly weekly "overturn" of employees, amounting in some cases to 50 per cent. of the entire force engaged, comfortable homes, suitable for family life or decent boarding places, must be built as a part of the general plan, and with them must go schools, churches, and cinemas, as well as playgrounds and recreation centers. There is no escape from this final conclusion, no matter how many costly blunders are made at the outset.

Stand for Permanent Construction

Here, then, is a field for the architect, and one indisputably his own. Architects by experience and training are accustomed to good permanent construction, and none other should be considered by the Government for an instant, for the Government must be made to learn that any other construction is simply building future slums for the working class.

Architects are used to completing buildings within a given, and usually inadequate, appropriation. This is part of their daily life, for the extravagant "cost plus" and "unit" systems of engineers have no place in their schedule. Up to the present, economy has formed no part of the Government's program, but there are signs of dawning sanity in this direction. The cities that are to rise around the great shipyards and factories must be "Garden Cities," in the best sense, which means that they must not only be healthful, attractive, and comfortable, but they must be good, permanent investments which will continue to be useful and paying propositions after the war when the purely military construction has gone to the scrap heap. Properly planned and built, these cities will be so attractive for workers that new industries will actually flock to them, and the Government's investment will be practically as well as sentimentally sound.

Unless architects heed the knock of opportunity the chance for utilizing their talents will be lost and instead of leading the march of civilization with a splendid showing of modern industrial cities, America will, as she has too often done before, build, instead as habitations for her industrial army, which is no less important than her military forces, an array of disease-breeding slums—a prey after the war to conflagration or worse.

Meeting of Ohio Engineering Societies

ENTHUSIASTIC desire to bring about professional unity in the State of Ohio was the outstanding feature of the conference of Ohio Engineering Societies held at Columbus, Jan. 29th, says "The Iron Age." The meeting resulted in the formation of a permanent organization christened the Association of Ohio Technical Societies, with Clyde T. Morris, professor of civil engineering of Ohio State University, as president and C. E. Drayer of Cleveland as secretary. All local societies and local sections of the national societies in the state, 12 in all, were represented, except one which has since indicated its desire to be included, so that the representation now includes all.

Delegates numbering 20, representing 10 societies, gathered in the library building of the University and, after a delegate from each society had told something of the strength and activities of the organization he represented, settled down to a discussion of the subjects proposed in the call. In the discussion of the general subject of co-operation and the organizations to be included in the state association, the opinion was expressed by the representative of the Columbus Chapter of the American Institute of Architects that the work of both architect and engineer would be improved if each made use of the special training of the other.

Resolutions were adopted endorsing the 10 cardinal principles adopted by the Committee on Engineering Co-operation at its conference last March; urging local societies to endeavor to have at least one engineer named on any board having to do with the expenditure of public funds where engineering experience would be of assistance; and endorsing the report of the Interstate Relations Committee of the Cleveland Engineering Society suggesting that the national societies consider as a pre-requisite to membership that a candidate show membership in an accredited local society. Employment, participation in civic affairs and statutory regulation of engineering practice were discussed, the last at length. With reference to employment, the consensus of opinion was that the employment problem is partly local and partly national in its character. It was felt that there should be an employment service national in character conducted by the profession and without profit.

Regulation by Law Possible.

All delegates seemed to recognize that regulation by law of the practice of engineering is coming and that if engineers do not recognize this situation and do the lawmaking themselves, somebody else will.

Various questions discussed and others will be placed in the hands of committees for working out after the societies constituting the conference have heard the reports of their delegates and approved the central organization.

Helped Protect Sprinklers

Through its official organ the Bridgeport (Conn.) Chamber of Commerce last month presented a series of suggestions for preventing the disastrous freezing of automatic sprinkler systems. These it was later learned "arrived just in time to be of service, and resulted in a number of commendatory statements from Chamber members."

Fire Alarms in Factories

THE text of a bill lately introduced into the New York Legislature requires that all factories over two stories in height to be equipped with fire alarm signal systems, as provided in section 83, when directed so to do by the Fire Commissioner, if in New York City, and by the State Industrial Commission elsewhere. At present such factories must have the signal system when more than twenty-five persons are employed above the ground floor. Amending section 94 by making the provision for liability of a tenant factory owner for non-observance of the provisions of section 81, relative to lighting halls and stairways, apply only to public halls and public stairways.

The American Can Co., Fruitvale, has just let the first contract in a new building program which will aggregate $1,600,000. It is estimated that the new plant will have an output of 15,000,000 cans per year.

A Department Devoted to the Use of

AUTOMATIC SPRINKLERS

Edited
IRA G. HOAGLAND, Secretary **PAUL MASON, Special Representative**
National Automatic Sprinkler Association

Water Curtain Test and Efficiency—Plenty of Water Necessary

As outside sprinkler systems are intended to protect against exposure fire by the cooling process due to wetting down the building so protected, it follows that the systems must be designed so that the largest possible amount of water thrown is thrown on the building instead of merely through the air across its face. This is true whether the protection is in the form of window sprinklers, in an incombustible building, or whether—construction being frame, or at least combustible—the entire face of the building requires this form of protection.

Recent tests in Boston and Atlantic City (N. J.) have demonstrated both the necessity of proper regard for the water distribution factor and the satisfactory nature of the protection afforded when the system is properly designed, when building construction is suitable for this form of protection, and when the distribution of water is such as to minimize the proportion wasted. The Boston test was of a window protection system in an incombustible building, supplemented, however, by lines of sprinklers under the cornices; the Atlantic City tests were of complete outside systems for the protection of frame hotels.

Interesting Boston Test

The Boston test—in the congested business section of that crowded city—was the annual water curtain test of the Filene store—an annual event that has become an institution in The Hub. Held in October, as one of the features of Fire Prevention Day observance, it attracted fire chiefs and fire prevention engineers from all over Massachusetts, a considerable part of New England and even from New York. More than 400 visitors witnessed the tests and the test run of the Boston fire department which was part of the exercises and sat down to the breakfast which was the social feature of the occasion.

On three sides of the building—Washington, Summer and Hawley streets—the curtain was tried out with complete success. Relatively little water was thrown into the air, but the windows were flooded with water under heavy pressure, and the cornice sprinklers at the same time sent a veritable Niagara coursing down the face of the buildings. The value of the system in the case of fire in surrounding buildings was thoroughly demonstrated, as the torrents of water thrown would make it virtually impossible for fire to break in from without.

Each window is equipped with from one to three open sprinklers, and in addition, a full line of sprinklers is emplaced under each cornice. Water is forced through these by high pressure service from the engine room on the Summer and Washington street sides. The system also is direct-connected with the city mains, which at that point furnish adequate pressure for effective hose streams on the roof, by connection with a number of hydrants. The roof hose and hydrant system also was tested as a part of the day's activities.

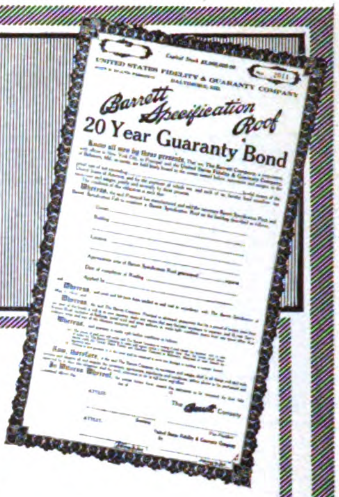
Besides the water curtain and roof system the store also is equipped with interior automatic sprinklers, both wet and dry; stand-pipe and hose on each floor; both soda and acid and pump-type fire extinguishers and a chemical engine on each floor, making it one of the most completely protected business establishments of its kind in the United States, if not in the world.

Importance of Construction Features

The Atlantic City tests were of an altogether different nature, being designed primarily to determine what modifications in ordinary frame construction would be necessary to assure maximum efficiency of outside sprinkler protection. The problem involved had arisen because The Leeds Company, which operates the Hotel Chalfonte, had purchased, several years ago, three small adjoining hotels—Cedarcroft, Warwick and Rydal—for the purpose of safeguarding its principal buildings. These properties were of frame construction, and under certain ownerships might constitute serious moral and fire hazards. After owning them for several years, The Leeds Company decided to protect them more fully from fire, in order that they might not serve as possible conflagration feeders. The method adopted has formed the text of an interesting report to the National Fire Protection Association.

Cedarcroft was first equipped with automatic sprink-

Barrett Specification Roofs



UNITED STATES FIDELITY & GUARANTY COMPANY

Barrett Specification Roof

20 Year Guaranty Bond

In San Antonio, for instance—

IN EVERY American city the principal new buildings are covered with Barrett Specification Roofs. On the large flat areas of such edifices this type of roofing wins on the figures, being low in its first cost, permanent, reliable, and having no maintenance costs whatever.

In San Antonio, for example, the principal new buildings of the last year are shown here—three handsome schools, a power-house, a large grocery, a warehouse, a large publishing-building—and they all have Barrett Specification Roofs.

All of these roofs carry Barrett 20-Year Guaranty Bonds. The procedure is as follows:

> The owner puts into his building specifications the clause, "The roof shall be laid according to The Barrett Specification dated May 1, 1916, and the roofing contractor shall secure for me the 20-Year Guaranty Bond therein mentioned."

Only competent roofers can obtain the bond and Barrett inspectors visit the job to see that the specification is followed.

On their certification of the contractor's due compliance with The Barrett Specification, the 20-Year Guaranty Bond is duly issued by one of the largest surety companies in America.

The bond costs the contractor and the owner nothing. It is issued in the interest of good materials and good workmanship, and we pay for it.

20-Year Guaranty Bond

The 20-Year Guaranty Bond is given on all Barrett Specification Roofs of fifty squares and over in all towns in the United States and Canada with a population of 25,000 and over, and in smaller places where our Inspection Service is available. Our only requirements are that the roofing contractor shall be satisfactory to us and that The Barrett Specification of May 1, 1916, shall be strictly followed.

Further information and copies of The Barrett 20-Year Specification, with roofing diagrams, sent free on request.

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland
Cincinnati Pittsburgh Detroit Birmingham Kansas City Minneapolis
Nashville Salt Lake City Seattle Peoria
THE BARRETT COMPANY, Limited: Montreal Toronto Winnipeg Vancouver
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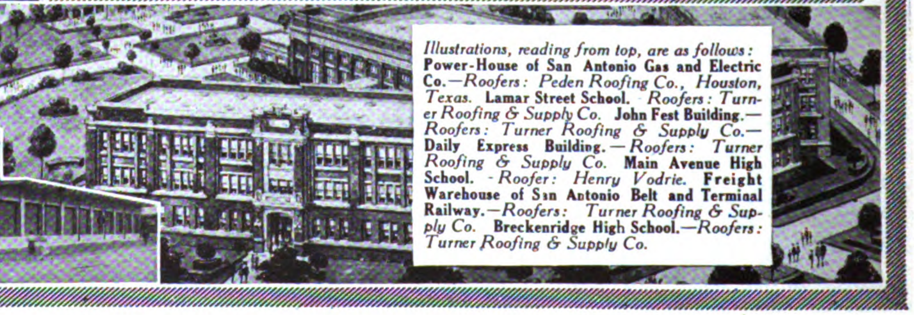


Illustrations, reading from top, are as follows: **Power-House of San Antonio Gas and Electric Co.**—*Roofers: Peden Roofing Co., Houston, Texas.* **Lamar Street School.** *Roofers: Turner Roofing & Supply Co.* **John Fest Building.**—*Roofers: Turner Roofing & Supply Co.*—**Daily Express Building.**—*Roofers: Turner Roofing & Supply Co.* **Main Avenue High School.** -*Roofer: Henry Vodrie.* **Freight Warehouse of San Antonio Belt and Terminal Railway.**—*Roofers: Turner Roofing & Supply Co.* **Breckenridge High School.**—*Roofers: Turner Roofing & Supply Co.*

lers. It contains 70 bedrooms and is the home of about 140 women employes. Two years later it was decided to protect the outside with open sprinklers. The schedule rating expert who was called in was not satisfied with the original plan to put a line of sprinklers at the top of the third-story windows and another at the top of the building, which is five stories high, and asked for the installation of a head at the top of each window. The amount of water required for either plan was so great as to seem prohibitive, in view of probable scarcity of water in time of conflagration, when the protection would be most needed.

The first step to improve structural conditions was the removal of a tower that had no economic utility and small ornamental value. Some of its members were set up near by and experiments made on them with various arrangements of heads and other devices. As in the case of all properly constructed frame buildings, it was found that most of the water was thrown off the building, whereas economical and effective use of water for a curtain requires that it be kept on at every point, to produce a continuous film of water from top to bottom. If the film is broken, the cooling effect of the water is lost at that point; and it is the cooling effect that prevents ignition and combustion.

After preliminary experimentation with the dismembered tower, a few heads were installed on the building as it was. Tests showed that probably 70 per cent. of the water dropped clear of the building and did very little good. Apparently 30 per cent. was effective. The loss of the 70 per cent. was clear waste. Woodwork under the test heads was then remodeled so that the water would be thrown on instead of off. An "in and down" slope of wood was installed under the cornice. Ther two places in each cornice bracket that had shed water were filled in so that they held it. The lowest row of shingles on the flaring belt course was rounded carefully so as to induce a flow of water to the clapboards. "In-slopes" under the window sills were installed for the same purpose. When the water was turned on again, it was found that fully 70 per cent. stayed on the building instead of flying off through the air.

Faces of Building Remodeled

The success of this experiment led to remodeling of all the faces of the building to conform to this description, and also to a decision to install the outside sprinklers at the cornice only, at the top of the building. No heads were put lower than this, except a few to protect the walls under several porch roofs. The result of careful thought and investigation therefore has been to procure economy in cost of installation, economy in use of water, and maximum efficiency for the water used.

Tests subsequent to the complete installation have demonstrated its efficiency. One wall, 53 feet high by 78 long, without porches, is protected by 17 heads with ⅜-inch openings at the cornice. At a recent demonstration the city pressure of 35 pounds covered the wall completely within 30 seconds from the opening of the valve. This light water film undoubtedly was ample for complete protection under normal exposure. At 150 pounds the water curtain was tremendous, and not only covered every square inch of wood and glass with a heavy sheet of water, but also poured down the side in a torrent, which probably would prove effective in protecting against an exposing fire of great severity.

Must Have Plenty of Water

As in the case of automatic sprinklers, the efficacy of the open sprinkler system or water curtain, once properly installed, depends on the adequacy of the water supply or supplies. Too often, in the case of a building not protected with automatic sprinklers within, dependence for water supply to serve the water curtain is placed on pumping capacity that has not been co-ordinated to the needs of the system. The result is disaster in event of exposing fire; and such a result is not only logical, but inevitable.

The writer recalls the case of an office building in Cincinnati, in December of 1912. Fire broke out in a hotel, building adjoining that was being torn down. The office building was completely protected on the north and west (exposed) sides with an open sprinkler system for which the minimum water requirement was 3,240 gallons a minute. The only means of supplying water was a non-standard fire pump in the basement, of 1,000 gallons nominal capacity, whose efficiency had deteriorated and that had to pump against a 200-foot lift to reach the top line of sprinklers.

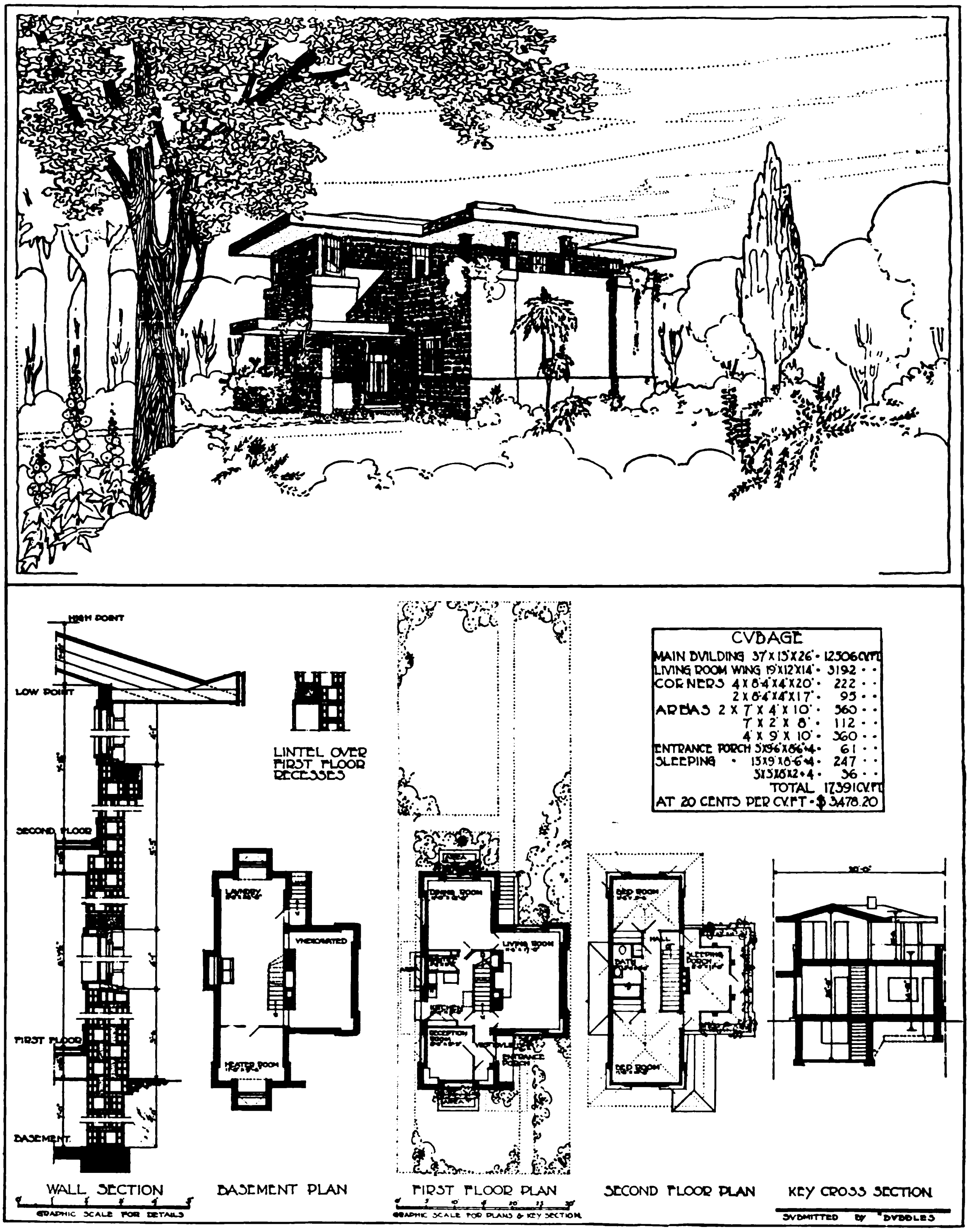
As windows (in a supposedly "fireproof" building) were of plain glass in wood sash and frames, water enough to keep them cool (and therefore safe) could not have been supplied even if the pump had been started at once. But the pump was not started until after fire had broken in at some of the windows, and by that time the inadequate water supply was absolutely useless.

The result was a large loss and much unwarranted criticism of a water curtain that had been properly designed and installed and then had been deprived of the ammunition without which it could not be expected to operate effectively.

All these things, therefore, must be given careful attention, and be the objects of unceasing vigilance, if the water curtain, or open sprinkler system, is to perform the duty for which it is designed, and which it does perform if it is given anything like a fair chance.

SAFE HOMES

Edited by **RALPH P. STODDARD, Secretary**
Society Advocating Fire Elimination



CVBAGE		
MAIN BVILDING	37'X13'X26' =	12506 CV.FT.
LIVING ROOM WING	19'X12'X14' =	3192 " "
CORNERS	4 X 8'4" X 4' X 20' =	222 " "
	2 X 8'4" X 4' X 17' =	95 " "
AREAS	2 X 7' X 4' X 10' =	560 " "
	7' X 2' X 8' =	112 " "
	4' X 9' X 10' =	360 " "
ENTRANCE PORCH	3'X9'6"X8'6"÷4 =	61 " "
SLEEPING "	13'X9'X8'6"÷4 =	247 " "
	3'X3'X8'X2÷4 =	36 " "
	TOTAL	17391 CV.FT.
AT 20 CENTS PER CV.FT. =		$3478.20

For Description of This House of Advanced Design See Opposite Page

A House of Advanced Design

RAPIDLY rising labor costs have opened up grave problems in home building. It has necessitated looking about for economical materials and methods of contruction to serve as off-sets.

One of the valuable developments along this line is self-facing tile—that is tile which of itself forms the exterior finish, without facing of brick stucco.

The house shown was designed particularly for the use of this material. It received mention in a recent competition conducted by the National Fireproofing Company of Pittsburgh for designs best suited to use of its product. The design, which is by George E. Elgh, Victoria, Australia, follows the so-called Chicago type, made popular by Frank Lloyd Wright. A study of the plans will show the many exceptional features it embodies. Chief of these is the upstairs porch—away from the heat and noise of the street—which may be used as a sleeping porch. Absence of windows in the front of the living room, making for privacy, is another advanced idea in house planning.

Constructed of self-facing tile, and requiring average specifications throughout, this house should be constructed in cities, where labor costs are not excessive, for from $4,500 to $5,000.

Folly of Building to Burn

SIX months past, in retrospect, are conspicuous for the great number of fires. Many of them have been fatal. This applies both to residence and commercial fires.

Origin of many of the latter have been traced directly to incendiary origin and many were in buildings of high class construction, so blame for the resulting casualties is difficult to fix.

But in the former, there are many instances of the fallacy of building to burn, which has for years seemed to have been the motto of those with money to invest in a home. A slight difference in first cost has led them to adopt wood as a building material—to their sorrow.

In several conspicuous instances costly buildings housing art treasures and valued personal properties have "gone up in smoke." Of these the most dramatic case was that in which Forest Hills, the summer home of John D. Rockefeller, at Cleveland, was burned to the ground.

This residence, upon which the oil king has expended a fortune in its remodelling and equipment, was almost totally destroyed by flames. But a few charred fragments remain—that is, with the exception of the half dozen or so smoke blackened chimneys, which stand intact, giving the lie to the fraud of "cheaper" frame construction.

A side-light on this picture of ruin is the fact that buried somewhere in this ruin are hundreds of thousands of dollars' worth of art treasures, gathered from all parts of the world. In addition, and which Rockefeller treasured most, are mementos and keepsakes of the owner's dead wife, priceless relics of days past.

Another of Ohio's rich men, a millionaire steel maker of Youngstown, lost a home, valued with its decorations and furnishings at millions, in a fire. Spread of the flames in this case was so rapid even prompt action of the part of the fire department was of no avail against them.

There is irony of fate in the fact that the steel maker was planning the erection of a safe home. In fact, he had acquired land and had plans prepared for a new home of absolutely fireproof construction, as though he had a premonition of impending disaster.

The list might be lengthened almost indefinitely, as there is adequate material in the fire records. But these two serve to emphasize that "it is better to be safe than sorry."

Automatic Sprinklers to Guard Warehouses

UNDER construction at Los Angeles, Cal., is a group of seven reinforced concrete buildings, the aggregate cost of which will be close to $3,000,000. The structures, which when completed, will cover an area of ten acres, and have a combined floor space of fifty acres, will include wholesale produce houses, a market of generous dimensions, offices, etc.

To insure their contents against loss by fire the buildings are equipped with an elaborate and well arranged automatic sprinkler system. The service embraces two underground reservoirs with a capacity of 75,000 gallons each, and two elevated steel gravity tanks with a capacity of 40,000 gallons each. The bottom of each tank is at an elevation of 37 feet above the roof of the tallest structures. Two automatic fire pumps, each with a capacity of 750 gallons per minute, will supply an abundant flow of water through the service pipes.

Use Fireproof Doors and Partitions

ARCHITECTS, contractors and property owners are reminded that the laws of Pennsylvania "require that plans for the erection of factories, hotels, halls of public assemblage, mercantile establishments and similar instiutions be submitted to the State Department of Labor and Industry for approval as to safety in construction to protect the occupants of such structures against the dangers of fire and panic." The Department further states that it cannot too strongly urge the protection of all internal stairways by the installation of fireproof doors and partitions.

If you ever wake up to this,
blame it on someone's inflammable roof

IN THE LAST FEW YEARS thousands of people of Atlanta, Baltimore, Salem and Paris looked helplessly on just such a sight—stood powerless while their homes, workshops and landmarks were eaten alive by the red scourge.

So long as we are human, carelessness, oversight and combustibles will prevail. So will fire. And while a single burned home or gutted factory is a severe loss to the individuals involved, the community fire is a real catastrophe. And it isn't an accident. It is the price charged by ignorance for a lesson in fire safety.

All such fires start small and spread large over the Inflammable Roof Route. Your home's protection from the community fire depends on the material fastened to its rafters. Your factory's chance in a conflagration depends on its roof material.

The modern roof has outgrown its function as a weather protection—it must be a fire preventative as well—and this is a specification for Johns-Manville Asbestos Roofings, resistant to heat, weather, and time. This modern roof is one of the biggest single contributions to fire-safe construction, and explains why slowly but surely the fire peril is lessened and the day comes nearer when it will flicker out.

Safeguard your property with one of these Johns-Manville Asbestos Roofings—Asbestos Built-Up Roofing, Asbestos Ready Roofing, Corrugated Asbestos Roofing, Colorblende and Transite Asbestos Shingles.

H. W. JOHNS-MANVILLE CO.
NEW YORK CITY
10 Factories—Branches in 61 Large Cities

WEATHER:
Always warm in winter and cool in summer if you are in a firesafe home, office or factory building.

The Fireproofing News

CONTAINING DETAILED DESCRIPTIONS OF NEW DEVICES AND APPLICATIONS OF MATERIALS WHICH ARE OF REAL VALUE IN FIRESAFE BUILDING: ALSO NOTES ON THE LATEST BOOKLETS, CATALOGS AND OTHER FIRESAFE LITERATURE, WITH OTHER ITEMS OF INTEREST TO THE FIREPROOFING FRATERNITY

LATEST EDITION

Copyright by Constrvction Publishing Co., of New York, N. Y., 1916

New York City, N. Y., January, 1918

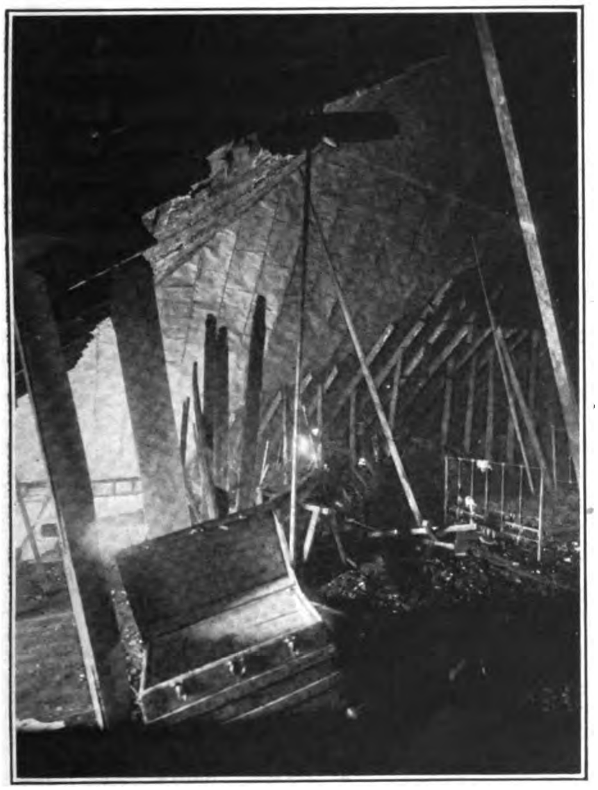
Priceless

TIN ROOF PREVENTS SPREAD OF FIRE

Students of firesafe building construction very properly place great emphasis upon the roofing question, appreciating that a covering of well chosen material laid in accord with approved practice, will act as a strong retardant against the spread of fire both within and outside the structure.

Case after case can readily be cited where buildings covered with roofs of incombustible material have stood intact, while properties all about them without such protection have been totally destroyed by the flames.

Odd Fellows' Orphanage, Goldsboro, N. C., Covered With Tin Roof That Successfully Held Interior Fire.



View, Showing Manner in Which the Roof Held Firm After Its Supports Had Been Burned Away.

Upon this page we present illustrations showing the resistance offered fire by a well chosen roofing. The building is that of the Odd Fellows' Orphanage at Goldsboro, N. C., roofed with tin roofing supplied by the N. & G. Taylor Company, of Philadelphia.

At the time fire broke out 120 children were asleep in the building. "That no lives were lost, and that the fire was controlled without further damage or spread to the surrounding properties, is largely attributed to the tin covering the building. This roof remained intact throughout the progress of the fire, confining the flames. After the fire was over, *the tin still held together in its original shape,* although only partly supported by charred fragments of the roof framing and sheathing-boards. The tin was left in such good condition that it seemed unfortunate that it had to be removed to build up the woodwork beneath."

The larger view shows the under side of the roof and the manner in which it resisted fire long after the supporting woodwork had been so burned as to be useless.

Defective Flues

Building Commissioner Rendigs, architects and contractors of Hamilton County, Ohio, are asked by the Cincinnati Fire Underwriters' Association to keep a close supervision of new homes under construction or that are being remodeled in order to decrease fires caused by defective flues. It is claimed that many of the recent fires described in the city reports as being due to "defective flues" could be overcome by the architect designing a proper protection about the flue of the chimney and the Building Commissioner's office seeing that this work is properly carried out. As plumbing, wiring and gas fitting must be inspected before these appliances can be used, Mr. Zimmerman recommended to the association that the city authorities aid in the reduction of fire losses due to insufficient protection about the flue.

Blackboard talks by the professor

No. 5—

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Concrete Institute Meeting

Because of the severe railway congestion and the resultant discomforts of travel the annual meeting of the American Concrete Institute, scheduled to have been held at Chicago on February 7-9, has been postponed until June 24-26, with Atlantic City as the gathering place.

Interior Fire Alarms in New York City

Under a recent amendment to the Building Code of New York City, the requirement affecting the installation of interior fire alarm systems in buildings was made to read:

"Interior fire alarms. In every hotel, lodging-house, public or private hospital or asylum, department store, and public schools, there shall be placed and provided, when required by the fire commissioner, an adequate and reliable electrical or other interior alarm system, to be approved by the said commissioner, by means of which alarms of fire or other danger may be instantly communicated to every portion of the building. The fire alarm apparatus and all other appliances placed or kept within any of said buildings for the purpose of preventing or extinguishing fires, or for affording means of escape therefrom in case of fire, shall be kept at all times in good working order and proper condition for immediate use, and any member of the uniformed force or authorized representative of the fire department may enter any of said buildings at any time, for the purpose of inspecting such apparatus or appliances."

A Big Time Expected

Those in charge of the Sixth Annual Convention of the New York State Builders' Supply Association—to be held at Buffalo February 19, 20 and 21—declare "it is going to be the best one that has ever been put on," and for that reason and the further fact that "this is a year of unusual conditions," urge an especially large attendance.

"The Best in Facing Brick"

Captioned as above the Beaver Clay Manufacturing Company, of New Galilee, Pa., has just issued a most attractive catalogue showing in color plates the appearance of its product.

Concerning the merits of brick as a building material the Company truthfully states: "The cost of brick and frame construction is now practically the same, brick being but very slightly higher—ordinarily from five to ten per cent. When the tremendous advantages of brick construction are considered—lower insurance rates, no painting, no decay, cooler in summer, warmer in winter, always beautiful, looking better with age—there is no question about brick being the cheapest and best material. Well-burned clay brick will stand the test of fire, weather and time."

Architects, contractors, dealers' contractors and prospective builders should secure and attentively peruse a copy of the catalogue, assured that they will be well repaid for the effort.

Fixing Tiles to Concrete Roofs

An invention recently patented by Alberto Floreani, of Trieste, refers to the fixing of tiles or slates directly to reinforced concrete without the use of wood. The main idea of the invention is to leave cavities in the reinforced concrete in which nails, staples, flaps, hooks or other means of fastening are to be fixed by means of some binding material which hardens in the atmosphere. The hollows can be made singly as holes, or as grooves running parallel, or at a right angle to the gutter of the roof.

Commenting on this invention a contemporary journal says that the methods of covering reinforced concrete roofs have not been able to keep pace with the extended use of this material for building purposes, and it has not been possible entirely to do without wood as a medium for fixing. The principle advantage of reinforced concrete roofs is supposed to be the avoidance of wood and other easily rotting materials. However, up to the present, it has not been possible to fix tiles or slates on a roof without wooden blocks, strips, or planking, in such a manner that the roof would fulfill the general requirements demanded of it and at the same time allow of the unavoidable exchange of single tiles or slates at a later period being carried out without special difficulty.

Army Buildings to Cost $268,650,000

Some idea of the extent of the Government's war preparations may be had from the statement officially made that contracts for the erection of new buildings have been or shortly will be let, the aggregate cost of which will be about $268,650,000.

Ambler Asbestos Shingles

A roof covering that is at once attractive, durable and firesafe is secured through the use of Ambler Asbestos Shingles, manufactured by the Keasbey and Mattison Company, Ambler, Pa. The shingles supplied as to color in Newport gray, Indian red, blue-black or veneered, are of standard quality and easily applied. The manufacturing company is ready to advise prospective builders freely, fully and promptly upon their roofing problems.

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Members of the National Association of Sheet Metal Contractors will hold their fourteenth annual convention at Milwaukee, Wis., on June 11th to 14th.

For Students of Concrete Construction

For the use primarily of students attending agricultural colleges, D. Scoates, A. E., professor of Agricultural Engineering at the Mississippi Agricultural and Mechanical College has prepared the Concrete Construction Laboratory Manual.

An idea as to the practical character of the work may be gleaned from the subjects topically dealt with, which include: "Fineness Test for Portland Cement; Normal Consistency; Soundness Test; Time of Setting; Silt Test for Sand; Colormetric Test for Sand; Per Cent. Foreign Matter in Sand; Granulometric Analysis of Sand; Determination of Voids in Sand; Determination of Voids in Aggregate; Concrete Tile Made in Homemade Apparatus; Concrete Tile Made by Hand Power Machine; Making Concrete Fence Posts: Making Concrete Hog Trough; Making Concrete Silo Blocks; Vicat Appartus."

A new corporation at Wellsville, Mo., is the Wellsville Face Brick Co., with a capital of $100,000.

The Average Man's Home

Practical Homes

ARCHITECTS, real-estate dealers, and prospective home builders will find the above plan books of pronounced help in selecting designs for houses to cost from $3,000 to $5,000 each. The plans were prepared by architects in all parts of the country, with the primary thought of designing houses that are at once attractive, convenient and economical as to cost of construction.

The price of either book is $1.00 per copy. Both can be had for $1.50; or either will be given as a premium to a year's subscription to Construction—the only National Firesafe Building publication in existence. A regular feature of Construction is its Safe Homes' Department, containing illustrations and plans for homes of fire safe types, designed for use of the man of modest means.

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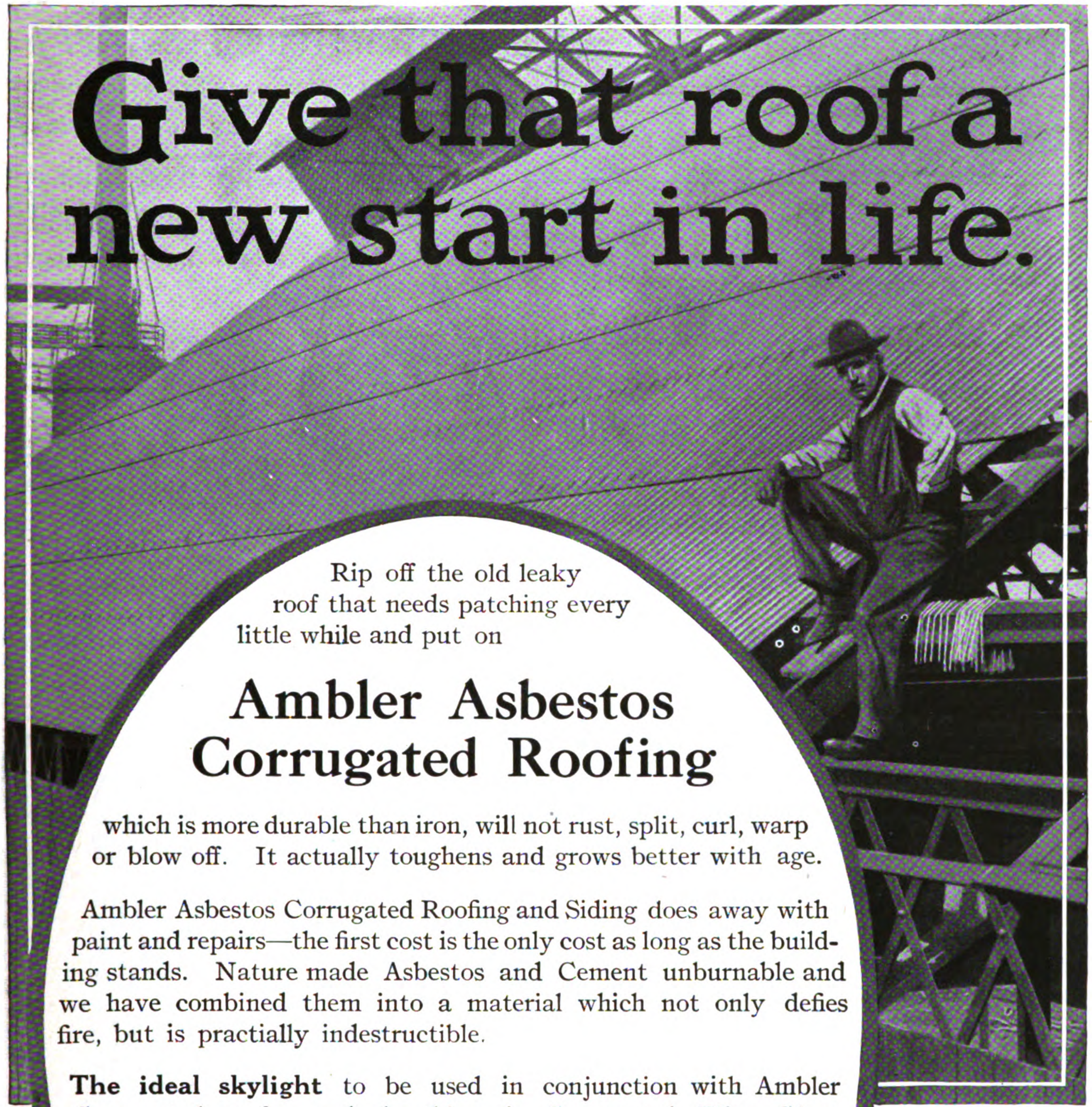

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ADVOCATING THE CONSISTENT VSE OF
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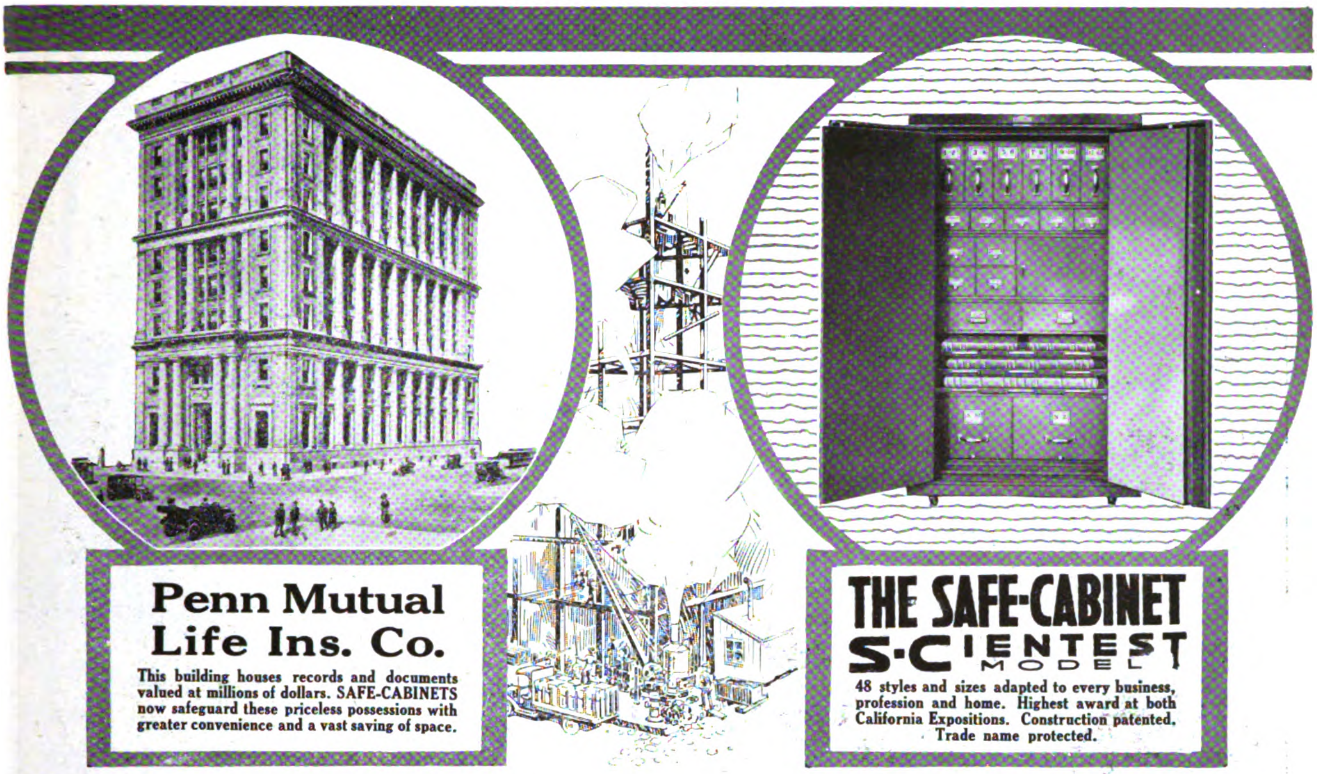

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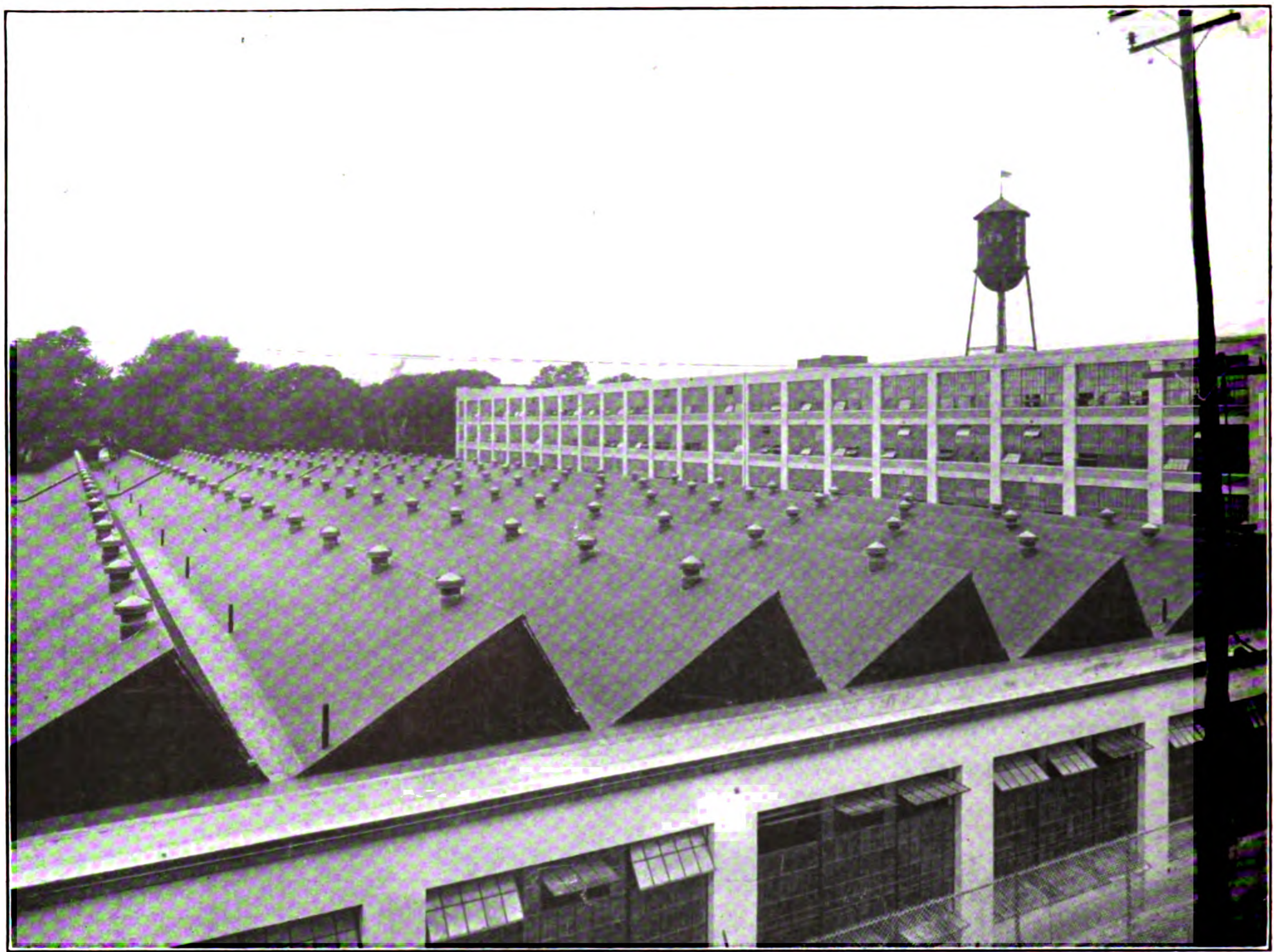

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CONSTRUCTION

ADVOCATING THE CONSISTENT USE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

Vol. VI **FEBRUARY, 1918** **No. 2**

Strictly Preventable Fire Causes

DURING the year ended December 31, 1916, property values in the United States to the aggregate of $208,685,340, according to the accurately compiled and verified figures of the National Board of Fire Underwriters, were destroyed by fire. Of this huge sum $60,446,054 was due to causes strictly preventable; $99,606,293 to causes partly preventable, and $48,632,993 to causes unknown, though it is a fair assumption that a considerable percentage of these too could have been prevented if ordinary prudence on the part of property owners had been exercised.

Here then we have a record of $150,000,000 of wealth lost to the country within the short period of twelve months, and without the inclusion of a conflagration of any magnitude; just an aggregate of small or moderately sized fires, the occurrence of which is viewed with complacency by Americans.

No wonder the charge of reckless extravagance is lodged against us by the people of Continental Europe, who have been educated to the sensible conclusion that every fire is a crime, and that the party suffering such loss is held to be a criminal against society unless it be clearly proven that the fire was due to causes beyond his control.

In the early days when the forests in America stretched in almost unbroken length from the Atlantic to the Pacific and from the Great Lakes to the Gulf, and lumber could be had for the cutting, the economic aspect of fires was given little or no consideration, and aside from the homes erected by the English settlers in Virginia—whose brick residences still stand staunch, comfortable and attractive after the passing of two centuries—the buildings of our country both mercantile and residential, were all of frame construction.

With the rapid growth of cities and towns, and the consequent decrease in timber land, the folly of building to burn began to sink into the minds of the people, and masonry construction came into vogue, its popularity growing as its numerous advantages became better known.

Despite the undoubted trend toward permanent and firesafe building the large number of frame structures, legacies from other days, still serves as a serious menace both to individual and to communal properties, and this menace will continue until each owner of a frame building, or a masonry structure with a wooden roof, be compelled by law to adopt those materials proven to be fire resistant, or in the case of industrial properties, forced to install such protective devices as will check fire in its very inception.

Upon another page of CONSTRUCTION will be found in statistical and illustrative form the figures of the National Board of Fire Underwriters classifying the fire loss of the country according to States and principal causes.

The showing is a graphic one and its lessons should be taken to heart by the property owners of the country; by real estate dealers, architects, engineers, municipal officials and all concerned in building operations.

Conservation of values is a patriotic duty at all times, but it is doubly so in these days of National peril, and in no more positive form can "conservation" be enforced than in the erection of buildings through the extended use of fire resistive materials, and their interior equipment with fire extinguishing devices.

Consider War-Housing

UNDER the auspices of the National Housing Association a conference upon the general subject of War Housing, was held at Philadelphia on the 25th inst. The speakers were all men having expert knowledge upon the subject, and in close contact with its present needs, and the probable line of development. As might be inferred the information gleaned from the free interchange of ideas at the gathering proved of the utmost interest and value.

An Experimental Study of Concrete

Synopsis of Lecture by DUFF A. ABRAMS*

THE most significant phases of research work to date may be characterized as follows: (1) Solution of the problem of the effect of size and grading of aggregate on the strength of concrete, (2) development of a scientific method of proportioning concrete, (3) determination of the function of water in concrete, (4) new theory of concrete mixtures, (5) methods for determining the relative merits of different aggregates, (6) development of a technique of testing concrete which gives concordant results. Conclusions generally based on compression tests of concrete at ages of 7 days to 1 year. In working out these problems about 50,000 tests have been made. No results of these studies have yet been published. Certain phases of experimental work still incomplete.

Effect of size and grading of aggregates on the properties of concrete. Research work already completed has enabled us to interpret the sieve analysis of an aggregate. It gives rise to a function called the "Fineness modulus" which furnishes a method of measuring the relative size and grading of any aggregate; enables us to reconcile many conflicting conclusions, such as those of Feret and Fuller with reference to this subject. Method of calculating fineness modulus. Use of sieve analysis diagram. Not necessary that the sieve analysis curve of an aggregate should follow any predetermined path; there are an infinite number of sieve analysis curves which will give equally good results in concrete. The fineness modulus gives a new method of proportioning concrete which is simple and at the same time entirely scientific. The present method of proportioning concrete is open to serious objections, in that with exactly the same quantity of cement in the mix we produce concrete in some instances only 50 per cent. as strong as could have been secured by a rational proportioning of the same aggregates. Objections to present method of indicating concrete mixtures. Use 1-4 instead of 1-2-3 or 1-1½-3 for road construction; that is, one volume of cement to 4 volumes of mixed aggregate, the aggregates available to be mixed in proportions that will give the best results. Bank-run gravel. Examples of use of fineness modulus in proportioning concrete.

Present specifications for concrete aggregates are on an erroneous basis, due to the fact that we fix the proportions of fine and coarse aggregate in advance and then attempt to make the grading of the materials such as will give the proper combination when mixed in predetermined proportions. Exactly the opposite procedure should be followed: that is, study the characteristics of the aggregates available, and then put fine and coarse together in proportions which will give the best results, considering the quantity of cement to be used and the character of the work. The fineness modulus method enables us for the first time to intelligently "design" a concrete mixture. The size and grading of sand less important than usually supposed. Many sands rejected under present specifications would, if properly proportioned, give better concrete than is generally obtained from materials acceptable under present specifications and proportioned according to current methods. The fineness modulus method of proportioning enables us to get the best results of which the materials are capable.

Discussion of gaps in grading of aggregate, and effect of maximum size. Comparison of mortar-making and concrete-making properties of sands. Concretes made from same coarse aggregate and different sands; concrete made from same sand and coarse aggregates of widely different characteristics—pebbles, crushed sandstone, limestone, granite, trap, flint, slag, etc. All aggregates conform to same general laws so far as effect of size and grading is concerned.

Influence of quantity of water on the strength and other properties of concrete. The detrimental effect of too much water is not generally appreciated. Failure to properly proportion water is the origin of many erroneous conclusions reported from concrete tests. Proper proportioning of water of fundamental importance in experimental work, especially when comparing different aggregates. Probably the most significant result from experimental work of the Structural Materials Research Laboratory is indicated by the conclusion that *the only advantage gained from using a coarse, well-graded aggregate is due to the fact that concrete can be mixed with less water than is required by a finer aggregate.*

Effect of different proportions of cement in concrete of different consistencies and sizes of aggregate. Increase in compressive strength of concrete for one

(Continued on page 44)

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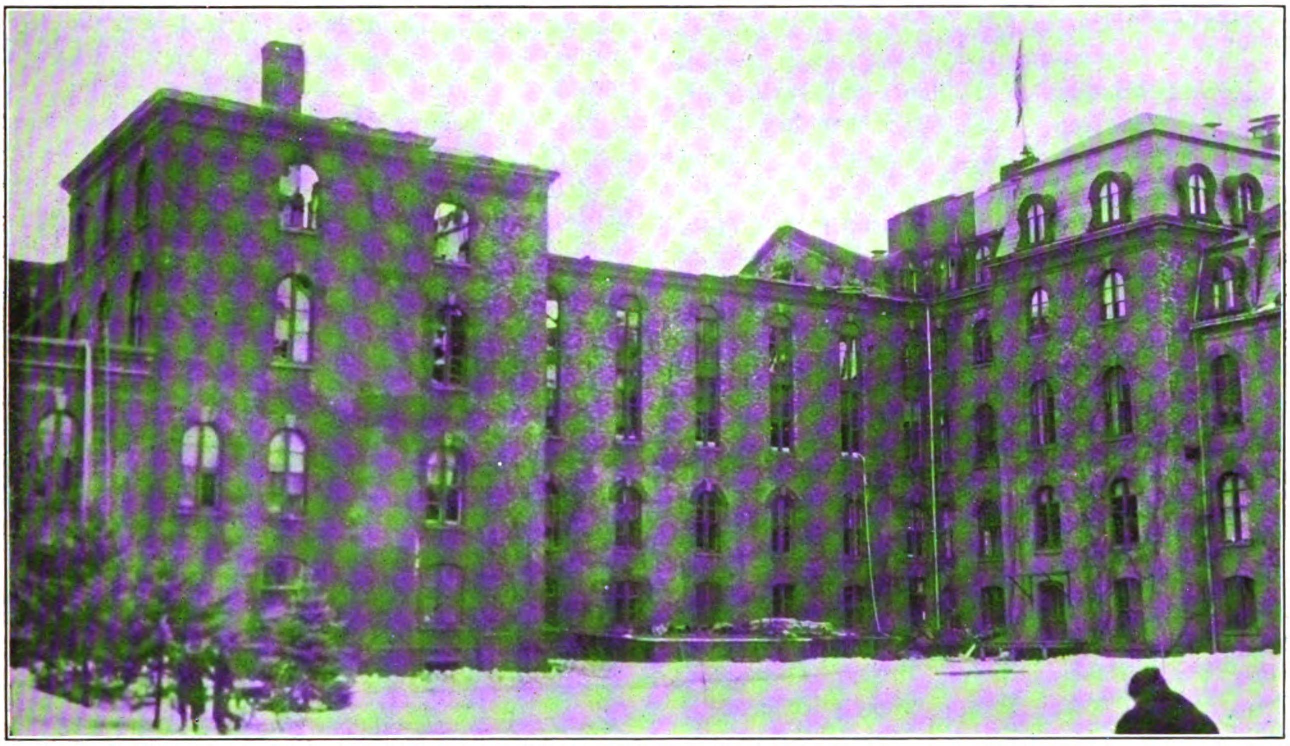
*The Structural Materials Research Laboratory is operated jointly by the Portland Cement Association and the Lewis Institute. The principal work of the laboratory is devoted to experimental researches in properties of concrete and concrete materials. The laboratory is completely equipped for all necessary physical and chemical tests. Experimental work was begun over three years ago. Particular attention has been given to studies of the effect of grading of aggregates and consistency; to methods of proportioning concrete and to developing satisfactory tests for concrete and constituent materials. The work is carried out by a staff of about 20 men, who devote their entire time to these investigations. Tests are being made at the rate of about 30,000 per year. The laboratory is under the direction or Professor Duff A. Abrams, who was for nearly ten years engaged in the research work with the Engineering Experiment Station of the University of Illinois.

Defective Chimney Flue Responsible for Dangerous Fire at Vassar College

A DEFECTIVE chimney flue is held responsible for the serious fire that occurred in Vassar College, Poughkeepsie, N. Y., on February 12, by which the eastern wing of the famous institution was completely destroyed, entailing a property loss of close to $300,000.

Fortunately the fire broke out at an hour—seven o'clock in the evening—when the students, the faculty and the servants were all about, ready to take care of themselves and save most of their belongings. Had it occurred at a later period, the consequences might have been far more serious than they were.



From an eye-witness we have received the following account of the fire:

"Smoke and soon flames were seen through the roof of the building directly over the dining room. Before the blaze was under control the two upper stories of 'Old Main' as far west as the administrative offices had gone up in smoke. The fire was confined to the eastern wing directly back of the administrative offices and main entrance, and did not spread to either of the big north and south wings in which the seniors have their rooms. The main floor of the burned portion was used for storage and receipt of goods. On the second floor was the student dining room, above it the assembly hall, formerly the old chapel, while upon the top floor were the servant rooms. Part of the wing was built as an addition four years ago, but most of the ruined portion was the original building of 1865."

Main Hall Original College

Main Hall of Vassar College is the original college and one of the historians writes of it as follows:

"Perhaps it was French blood in the veins of the founder which led him to adopt the Tuileries, the ancient home of French monarchy, as the model of the main college building, nearly 500 feet long, plain in material and style, the dull brick walls would look bleak and bare were it not for the luxuriant ivy which covers the building and oft recalls a tower or corner of the Rhenish castle.

"Through the porte-cochere one enters the broad hall whose marble staircases on either hand lead to a main corridor of the building and to the Thompson Annex Library."

The Main Hall is one of the three buildings that constituted the college in 1865. It contains the administrative and business offices, the book store and post office, a large assembly hall, formerly the chapel, and accommodations for 400 students and faculty. In the eastern end of the building on the north and south wings were the apartments for the maids.

The building was constructed of dull red brick, the joints pointed with black mortar. The water-

All That Remained of Vassar College Building Roof After the Fire

tables and trimmings of the doors and windows were made of blue free-stone. The center building and wings were five stories in height, and the connecting portions were four stories in height. Within the building are five independent dwellings for officers, 400 students' apartments and full complement of managers and servants. Besides there is a chapel, which up to the time of the fire was being used as an assembly hall, dining hall, parlors, art gallery, philosophical apparatus, lavatories and cabinets of Natural History.

The building was erected at a cost of $500,000. It is 500 feet by 200 feet through the center and at the transverse wings 164 feet.

The fire in Vassar College following as it does that which destroyed Wellesley College only a few years ago emphasizes the wisdom not only of employing every possible safeguard against fire in the construction of buildings in which so many human beings and such valuable property is stored as are found in our institutions of higher learning, but the need for an effective system of interior fire protection as well.

The initial cost of such construction and installation would be insignificant in comparison with the degree of immunity from the fire menace their adoption would insure.

We feel that the time will soon come when parents in selecting colleges and universities for their sons and daughters will give as close study to the degree of safety from fire which the different institutions offer as to the curricula employed or to the talent of the faculty.

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Building Activity in Ohio

DELEGATES representing supply dealers in every county of Ohio—more than seven hundred of them—were in Columbus January 23-4-5 for the annual meeting of the Ohio Builders' Supply Association. This year's sessions were "strictly business"; the social side being relegated to a very minor place. Following a year of exceptional conditions—one in which material costs piled themselves upon labor costs with a rapidity never before equalled—the dealers were in a mood to "talk shop" and not much else. The program was arranged with this in mind and comprised talks upon most every subject vital to the trade, costs, wages, transportation, etc. The data brought by the delegates from the various sections of the state combined to make a mine of valuable information for those present to take back to their local chapters.

The office of the president was moved by the election from Toledo to Cleveland, W. T. Rossiter succeeding H. Holst, as president of the association. Ralph P. Stoddard was re-elected executive secretary for the year current.

One of the most interesting facts disclosed by the gathering of supply dealers from throughout the state, was that many smaller cities showed exceptionally in building during 1917. While the larger cities, including Cleveland, Cincinati, Toledo, Columbus and Dayton showed losses in aggregate from the previous year, many of the smaller cities piled surpluses upon the 1916 figures. Among these was Youngstown, which showed a tremendous gain in money invested in new construction over that for the year of 1916.

Ohio long has been known for its many "big little cities" and such records as many have made during the year of 1917 go far toward justifying claims made for them.

Experimental Study of Concrete

(Continued from page 42)

per cent. increase in cement—an important phase of the problem of proportioning.

Density of concrete. Density difficult to determine; greatly influenced by difference in quantity of cement and water. The density of rich mix less than leaner. The fineness modulus enables us to go back of the density and study the factor which is largely responsible for differences in density; consequently, with this method of proportioning little or no attention need be given to the density of the resulting concrete.

Voids in aggregates. It will be shown that the accepted theory that concrete aggregate should be graded in such a way as to give minimum voids is entirely erroneous. On the other hand, the maximum strength of concrete is secured with a grading that gives a much higher percentage of voids than that corresponding to the maximum density for a given maximum size of aggregate. If the maximum size of aggregate is increased using a sieve analysis curve of the same form, then the strength of concrete increases as the voids are reduced.

Economy in the Design of Reinforced Concrete Buildings*

By Clayton W. Mayers, of the Aberthaw Construction Company

Part I.

UPON the designing engineer of concrete buildings rests the big responsibility of conservation of building materials. The mere fact that concrete is composed of cement, sand and stone, of which there seems to be an excellent supply, does not in any way relieve the designer of concrete construction of the obligation of careful study in order that no excess of material be used. Most errors made in concrete design are not easily recognized even by experienced estimators of building construction. Hidden away inside a column there may be reinforcing steel which should be elsewhere doing work at less expense to the owner, as would have been the case had the designing engineer given proper thought to the design of this column. A large percentage of the floor space occupied by columns might be storage space for the same reason. The beams may contain an excess of steel reinforcement simply because it was less trouble to call for straight top rods to take care of negative bending than it was to determine where and how bends could have been made in order to have used the least amount of reinforcement in the design. Flat slabs may have a number of individual rods over the top of each column head, where a few more bottom rods should have been bent up to take care of this negative bending. And yet this entire building may have been designed in accordance with the recognized standards of concrete design. These errors are not errors in computations, but are errors of careless design and the result is dire waste of material.

Study for Economy a Necessity

In most cities building plans are O. K.'d by responsible engineers authorized by the city to pass upon these plans before the work is allowed to proceed. Errors in computation are usually detected in this process, but who ever heard of one of these authorized engineers returning a set of plans with suggestions for a more economical design? Provided the building is strong enough the design is approved. It is not the function of city building departments or their engineers to look for economies or suggest savings.

Hence, if the designing engineer does not study economy in the design of his work, he may be reasonably sure it will get very little such study from any one. Designs prepared without this special study are sure to show a waste of building material, and the building is no better, and serves no better purpose, because of this extra expense.

Recognized standards are observed by most designers of concrete buildings as regards stresses and strains, factors of safety, etc., but unfortunately no rules, tables or data are at hand which will solve the problem of maximum economy in the choice of the various methods of concrete construction which may be used. Each building presents new problems. It is a case of careful study in an intelligent way and the designer must do this work well if he would "do his bit" and at the same time keep or build up his reputation.

Is there any position more humiliating to the designing engineer of a contemplated structure than to have other parties submit to the prospective owners a more economical design based on the same fiber stresses as were used in the original layout? This is not an uncommon event and uncomfortable complications always arise.

A general survey of conditions and inspection of the possible methods of construction usually constitute the first thought given to a new problem of structural design. By this inspection a process of elimination is set up and finally the engineer considers only a few schemes which could be well employed to give the owner a structure suitable for his purposes. The next step usually consists of viewing the several schemes from every angle in order to study their individual merits. Each layout possesses different advantages, some of more value than others, but each one would answer the purpose very well. For instance, a beam and girder type of floor construction may offer advantages in the way of hanging shafting if the building is to be used for certain types of manufacturing. Column spacing would perhaps work out to better advantage in one scheme than in another. Thus the discussion continues with here and there a remark about the probable cost of this and that. A decision is usually made in favor of the scheme offering the most advantages even though they are trivial. The plans are drawn up on this basis and the work proceeds. The detailed design is finished with about the same attention to costs as has been given to the selection of the type of construction used. Generally, the owner of the completed building is satisfied, and if he could have had just as good a building for less money he never knows it.

Comparative Cost Estimating

The average concrete designer makes no claim to being an estimator. In fact, he does not think it is necessary to be an estimator even of the materials with which he works. It is a fact that a large majority of men employed in the design of concrete buildings have hardly any idea of the cost of the work they are laying out, and what is more, they do not know how to find this out for themselves. Surely, if an engineer designed a structural steel girder he could tell with reasonable accuracy what it would cost by computing the weight and getting the market price of the structural steel and the labor cost of erection. Estimating the cost of concrete work is a little more complex, but each step is very similar and the process is the same.

A designer of concrete structures should think continually of costs. In order to think intelligently of the cost of his work he must know how to calculate approximately the cost of his designs. In no other way is he able to determine which one of his studies will serve his purpose at the least expense.

It should be borne in mind that in making designs for comparative costs, it is not necessary to work to as great a degree of accuracy as for the finished plans. Rough designs, accompanied by rough sketches, will furnish enough information for this study. In case the comparative costs of two schemes should work out the same, a more careful design might become necessary. A little practice on the part of the designer will soon reveal to him to what degree of accuracy he must work in order to get satisfactory results.

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*Prepared for presentation at the Fourteenth Annual Convention of the American Concrete Institute.

Accuracy of Unit Costs

The process of estimating these various designs for comparative cost purposes is not nearly as difficult as may be supposed. Concrete is measured by the cubic foot or cubic yard, forms by the surface measurement in square feet and reinforcement by the pound or ton. After the quantities have been calculated for the various designs, unit prices are fixed and the total cost of the member estimated. It is usually here that the engineer throws up his hands. In fact, it is very likely that he knows but little about the prices of this class of material and labor, and in his rush of work he has not kept in touch with their fluctuations, and feels he does not have time to inform himself properly on this subject. Again, it should be understood that it is not necessary to fix absolutely accurate unit costs to these quantities in order to obtain reasonably accurate cost comparisons. As long as the same unit costs are used for similar types of work in the various designs, the comparative costs will be surprisingly accurate. In fact, some of the unit costs may be in error 25 per cent. or 30 per cent., and yet the resulting costs will show unquestionably which type of construction should be used. However, the alert engineer will soon become as interested in having his unit costs in accordance with current prices of material and labor as he is in having his design correct.

Effects of Design on Costs

Contrary to the opinion of most engineers, the concrete building design calling for the least amount of material is not always the cheapest building to erect, as such a building may call for much more labor. Form work is a big factor in the cost of concrete buildings, and this phase of the operation must be given careful consideration in order to simplify the construction of the form work as much as possible. Study must be made also to determine whether the complexity of forms in a comparatively light design would not make the final cost of the building in excess of a building designed of simpler yet heavier construction. Concrete floors designed on the flat slab method sometimes have considerably more material in them and yet work out cheaper than a beam and girder type designed for the same conditions. Placing reinforcement costs more per ton and forms more per square foot in a beam and girder construction than the same operations in a flat slab construction. In laying out floors of the beam and girder type, the addition or omission of one beam per bay may influence the cost of the design a great deal. Changes in column spacings will also have the same effect. It is only by making the design of a typical floor bay of the various schemes considered and getting the quantities and costs of these schemes that it will be possible to tell definitely which method should be used. Many times concrete columns should be composed of a richer mix of concrete and have less reinforcement. In a building of several stories it is necessary to devote considerable study to the design of columns in order to locate the point where the mixes should change, where spirally reinforced columns should be introduced, and also to consider carefully the loss or gain of floor space occupied by columns. It will be necessary to make several sketch designs and calculate the cost of each. Thousands of dollars may be wasted by improper column design and still the error is one which would not readily attract attention. There is a certain type of design for every part of the construction which will show maximum economy and it is up to the designing engineer to calculate the costs of his various designs and determine for himself which one should be used.

Unit Costs for Comparative Estimates

Up to this point this article has emphasized, principally, the necessity of making several preliminary designs of the various members of a concrete building and calculating the cost of each design before the final layout is begun. Not much light has been shed upon the method of obtaining unit prices to fix to the quantities of material and labor. Unit prices are subject to wide fluctuations. Markets, labor, location of the work in question, speed of the operations, etc., and many other items enter into the making of these costs. However, as stated before, these unit prices need not of necessity be extremely accurate, and the designing engineer need not feel that he cannot price closely enough to obtain fairly accurate results.

A list of approximate unit prices has been tabulated here which may be used to calculate the comparative costs of the principal members in a concrete building. Judicious use of these unit costs will enable the designer to incorporate in his design the most economical methods and at the same time develop a keener eye for economical construction.

Concrete

In estimating the cost of concrete it is necessary first to ascertain the cost, delivered at the job, of cement per barrel, sand per cubic yard, and crushed stone per ton. Knowing these costs it is a simple matter to calculate the total cost of the materials which go to make a cubic yard of concrete. Add to this cost of materials the proportionate cost of "plant" and the cost of mixing and placing one cubic yard of concrete, and we have the estimated unit cost of one cubic yard of concrete in place. The following tabulation is a detailed estimate of the cost of concrete mixed in the proportion of 1:2:4.

Concrete (1:2:4 mix), per cu. yd.:		
Cement, 1 2-3 bbls. at $2 per bbl. at the job		$3.33
Sand, ½ cu. yd. at $1.50 per cu. yd. at the job		.75
Crushed stone, 1 3/10 tons at $2 per ton at the job		2.60
Plant, cost per cu. yd.		
Freight charges	$0.05	
Rental of mixer, etc.	.35	
Small purchases, fuel and supplies	.45	
Labor	.40	1.25
Labor of mixing and placing		1.25
Total cost per cu. yd.		$9.18
Total cost per cu. ft.		.34

Concrete mixed with the proportion of 1:1½:3 will require about one-third of a barrel more cement per cubic yard. This will add about 67 cents to the cost of one yard of concrete in place, making the unit price about $9.85 per cubic yard, or 36½ cents per cubic foot. If a 1:1:2 mix of concrete is used, the cement will be increased about 1 2/10 bbl. over and above that used in a 1:2:4 mix. At $2 per bbl. this would make the cost of 1:1:2 mix concrete about $11.58 per cu.

yd., or 43 cents per cu. ft. In large plain concrete footings it is sometimes advisable to use a concrete mixed in the proportion of 1:2½:5. Concrete mixed in this proportion requires about 3/10 of a barrel less cement than 1:2:4 mix. Figuring cement at $2 per bbl., concrete mixed in the proportion of 1:2½:5 works out at approximately 32 cents per cu. ft. in place.

In calculating the amount of materials necessary to make 1 cu. yd. of concrete, it will be noticed that the only change made in the quantities for the various mixes has been in the amount of cement used. It has been assumed that a cu. yd. of 1:1:2 concrete will require the same quantity of sand and crushed stone as a cu. yd. of 1:2:4 concrete. Theoretically this is not true, but in general practice there is some waste of material and it has been found that the small differences of aggregate used in the various mixes of concrete in a building are negligible. A very large part of the concrete in a building is a 1:2:4 concrete, therefore, the aggregate quantities of 1:2:4 mix are generally used for all concrete work and the cement alone is changed for various mixes. It will also be noted that the quantity of cement, sand and stone used here is somewhat in excess of the amount usually given in the tables published in various textbooks. It must be borne in mind that the waste of materials on the job must be absorbed and the quantities in tables compiled by laboratory tests must be somewhat increased. It is actually necessary to estimate on about 1 2-3 bbl. of cement to make 1 cu. yd. of 1:2:4 concrete on a job where the usual construction methods are employed and in other mixes of concrete the cement should be proportionately increased.

The prices of concrete work as tabulated here are about 30 per cent. in excess of pre-war prices and 50 per cent. more than the prices of 1913. These costs based on the present high cost of material and labor should be adjusted from time to time as necessary.

"Plant"

In making estimates for the cost of concrete in place, the most uncertain element entering into this cost is the item of "plant." The cost of "plant and tools" varies greatly with different contractors, and depends largely upon the foresight of the persons responsible for the layout of the job operations. The number and location of the mixers, towers and runs used on the job, layout and extent of storage space for aggregate, source and expense of power, etc., distance over which concrete machinery has to be transported, good or bad mechanical condition of rented machinery, rental rates of machinery, replacement of missing shovels and other tools and many other variable expenses go to make up this cost. The size and shape of the building, as well as the speed of the operations, play an important part in this cost. The "plant" cost for a job containing 6,000 cu. yd. of concrete need not necessarily be one-fifth more than a job containing 5,000 cu. yd. of concrete. The "plant" will, of course, cost more for the job containing 6,000 cu. yd. of concrete, but since the cost of erecting and dismantling the "plant" work for both jobs may be the same, the extra cost of "plant" for the larger job will be principally extra depreciation or rental, fuel, power, wear and tear and loss of tools. However, "plant" expense enters into all concrete costs and must be included in the unit price of concrete if we would get a reasonably accurate idea of the ultimate cost of the work. At the present high cost of all building materials and labor, "plant" costs cannot be safely assumed to be less than $1 per cu. yd. and will very seldom run as high as $2 per cu. yd. of concrete. Owing to this wide variation in the cost of "plant," it is necessary in estimating concrete to strike an average cost which, while not accurate, will cover the usual "plant" work, and give a unit cost for concrete in which all items of material and labor have been considered. It is with this in view that a "plant" cost of $1.25 per cu. yd. has been used in making up the unit cost of concrete in place as given in the foregoing tabulation.

Steel Reinforcement

The cost of steel reinforcement is extremely erratic in its fluctuation, but at present it may be assumed at $90 per ton exclusive of the labor of bending and placing. It will cost from $6 to $15 per ton to cut, bend and place this reinforcement, $100 per ton, or 5 cents per lb., being a unit price which may be used to give reasonably close cost ratios. Reinforcement requiring much bending and made up of small bars should be figured about ½ cent per lb. higher than steel requiring only a small amount of bending. Spiral reinforcement for columns should be figured at an extra cost of about ½ cent per lb. over and above plain bars. In estimating the weight of spiral reinforcement it should be remembered that about 7 per

(Continued on page 48)

Ready for Occupancy in Seventeen Days

IN the January issue of CONSTRUCTION we noted the creditable achievement of the National Fire Proofing Company, of Pittsburgh, in completing within seventeen days an extensive and substantial structure for use of the Ordnance Department of the Federal Government at Washington; presenting at the same time a series of illustrations showing the progress of the work at advancing periods.

The following additional data in connection with the structure—of which Waddy B. Wood, of Washington, D. C., was the architect—will prove interesting.

"The building is of reinforced skeleton construction, with curtain walls of 8x12x12 NATCO XXX hollow tile, finished on the exterior surface with cement stucco plaster. All floors and the roof are of superior fireproof construction, being composed of a combination of reinforced concrete joists and 6x12x12 NATCO hollow tile fillers between the joists.

"Used in the construction there were 620 cubic yards of concrete work, exclusive of 15,000 square feet of 1 and 2-inch cement finish; 29,000 square feet of forms were placed, involving the use of 100,000 board feet of lumber, and 640 tons of NATCO hollow tile. The floors used were those known as 6 inch plus 2 inch NATCO Combination, that is tile 6 in. thick between joists 4 in. wide, cast monolithic with concrete top of 2 in., total thickness for the structural floor of 8 in."

Reinforced Concrete Framework for School Building

IN preparing plans for the U. S. Grant school building recently authorized by the Duluth (Minn.) Board of Education, the architects and engineers, Croft and Boerner, of Duluth, determined upon a reinforced concrete framework of the skeleton type, without exterior or interior bearing walls. "This type," the architects held, "was especially adapted to the site where the building is located, the structure literally covering a twenty-foot deep hole (a natural creek gully)."

The general structure will be of reinforced concrete, brick, tile and stone. Very little excavation was necessary on the grounds, it being the purpose to fill up about the building. A further motive in using the skeleton type of construction was to secure speedier work. "All columns and beams," say the architects, "will be hidden in the 4 inch tile partition work in the interior of the building." The structure, which will cost $127,000 to build, will have 19 class rooms, and in addition, the principal's office, teachers' room, medical inspection room, gymnasium, auditorium, locker room, stage, motion picture booth and book room. A low pressure heating plant will be installed with a vacuum pump. The building is designed for the later addition of two wings of six rooms each.

George Lounsberry, of Duluth, is the general contractor.

In addition to the Grant School noted above the Duluth Board of Education will soon authorize the construction of a further building, with still others in prospect.

Economy in Design of Reinforced Concrete Buildings

(Continued from page 47)

cent. should be added to the weight of the spirals for welding laps. Also, it will be necessary to add about 3 lb. per lin. ft. of column for spacers used to hold the spirals in proper pitch.

Forms

Forms for round columns are usually made from sheet metal and in flat slab construtcion it usually works out cheaper to use round interior columns formed with this material. However, the cost of forming an interior column 26 in. in diameter for flat slab construction is about the same as forming a column 20 in. in diameter designed for the same purpose. This being the case, it is not necessary to consider the difference in the cost of forms due to different diameters of round interior columns. It may be well to remember that it costs somewhat less to build an interior column having a head by using a steel form than it does to form the column of wood, as the cost of forming the head in wood is no small part of the column cost. The list of unit prices given here covers the cost of labor and material for form work for the principal operations in a concrete building, but are tabulated for use in making comparative estimates only. It must be borne in mind that these unit prices are for the use of the engineer in weeding out the more expensive designs and are not to be used for making actual estimates of buildings without regard to conditions and what not. While these costs might be more or less useful in arriving at the total cost of a concrete building it should be remembered that they are only approximate units to be used for the purpose outlined herein.

Type of Construction.	Square Feet Cost. (Surface Measurement.)
Forms for flat slabs, including drop panels	$ 0 09
Slab, beam and girder construction, slabs to span not less than 9 ft.	.12
Slab, beam and girder construction, slabs to span not less than 7 ft.	.13
Slab, beam and girder construction, slabs to span not less than 5 ft.	.14
Column forms	.15
Floor beams and girders, not including slabs	.16
Wall beams	.14
Partitions and wall forms	.15
Footing and foundation forms	.15
Round steel column forms, including heads, each	15.00

Estimates Made From Cross-Sections

Now that the methods of arriving at the comparative costs of the various types of concrete construction have been outlined, it is believed the designer will be able to work more intelligently regarding the cost his work involves. Typical dimensioned sketch cross-sections of the building from the roof slab to the footings should be made and the work of estimating done from these sketches. In this way the extra column lengths required to obtain the same clear story heights will enter into the estimate. This is quite a factor in comparing flat slab with beam and girder designs. Estimates made from these cross-sections for a length of building equal to one bay only, is the usual practice. In this way the cost per lineal foot of building as well as the cost per square foot of floor space may be calculated. Comparisons of costs made in this manner are genuine proofs to the designer that he is giving the design proper study for economy, and will result in a conservation of building materials, save good dollars for the owner, and establish for the engineer the reputation of being a designer of economical concrete buildings.

Million Dollar Home for Athletic Club

Contract for a fine new million dollar building to be erected for the Kansas City Athletic Club, at Kansas City, Mo., has been awarded to the Wells Brothers Construction Company, of Chicago.

Specifications for the intended structure, we are advised, will probably not be completed for a month or six weeks yet. When the building is erected it will prove a noteworthy addition to the semi-public structures of the progressive mid-West city.

Building associations to the number of forty located within the metropolitan district of New York, recently formed a joint organization for the purpose of stimulating general building operations, and seeking wherein they might best serve the interests of the National Government. Hugh Getty was chosen president and Allen E. Beals, secretary.

The Concrete Stud and Cement Stucco House

A Permanent Construction Adaptable to Industrial Housing, Base Hospitals, Barracks, etc.

By William E. Groben

THE war has given a prominence to industrial housing it did not formerly possess. Despite the emergency measures undertaken by the National Government, industrial corporations and private capital, the difficulties presented by the problem have not been solved. The housing situation in the United States still remains an important and vital factor in our war-time industrial production, demanding the highest scientific consideration and treatment.

It is useless to encourage industries to expand, to place war orders with our manufacturing plants, ship yards, etc., while leaving the housing of our workmen to take care of itself in some unforeseen manner. Our ability to increase production in our industries is dependent upon our ability to house the workmen. The present lack of sufficient sanitary houses to provide the necessary accommodations for additional workmen is resulting in dangerous overcrowding, excessive labor turnover, and is hampering the progress of war work in practically all industrial centers.

Our town-planning experts, our architects and our engineers are devoting their every energy to devise ways and means to remedy this menacing situation. Their purpose is to provide sanitary homes which may be built with rapidity and which will not only be permanent, but also fire-resisting, instead of continuing to erect temporary make-shifts of inflammable construction.

Not the least among these is the firm of Ballinger and Perrot, architects and engineers, New York and Philadelphia, who have had a vast experience in the design and construction of industrial villages in connection with large manufacturing plants.

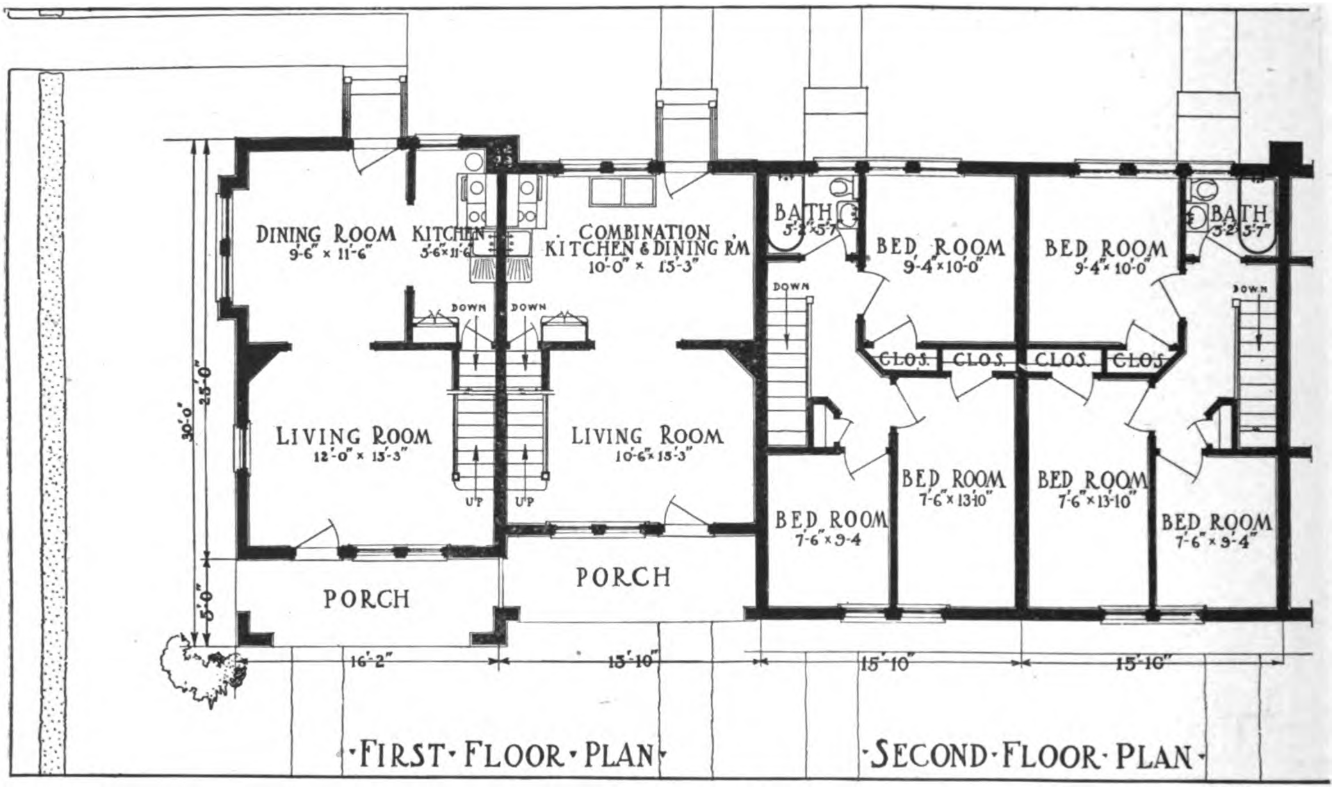
Rapidity and Permanency of Construction

In order to meet the high cost and scarcity of building materials, principally brick and lumber, E. G. Perrot, of this firm, has devised and perfected a system of construction which makes the erection of large numbers of permanent and durable houses in record-breaking time a possibility. This type of construction is styled the "Concrete Stud and Cement Stucco Wall," and is admirably illustrated by the isometric pictures, shown upon the following pages.

In this type of construction, reinforced concrete is substituted for masonry walls, not, however, of the poured monolithic system customarily used heretofore, but, by applying the concrete either by hand or by means of the cement gun. Concrete is particularly adaptable to this form of building because it is permanent, fire-resisting, sanitary and waterproof; and when used in the large scale operations contemplated at the present time, it makes for maximum economy by employing labor saving machinery and re-using equipment. Furthermore, concrete is generally a more nearly local building material than any other, and its use not only materially assists in relieving the already overtaxed transportation facilities of our country, but also eliminates the delay in construction due to embargoes and irregular shipments.

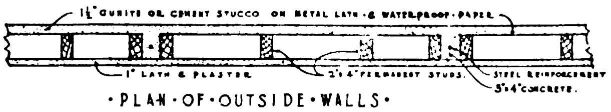
Claims for the New Style

We confidently claim this style of construction to be unique in its conception and superior in merit to all others devised for the industrial classes. Expert comparison is invited while we enter upon descriptive details. It is without exception the cheapest and best method to be employed for the quick erection of industrial houses at any time and particularly during the present shortage of labor and material. It requires the fewest laborers, the shortest time for erection and, having hollow walls, produces a dryer house than obtained by any other form of masonry construction. It is likewise adaptable to base hospitals, barracks, one story factories, etc. In factory buildings, where no interior finish is required, the interior wall

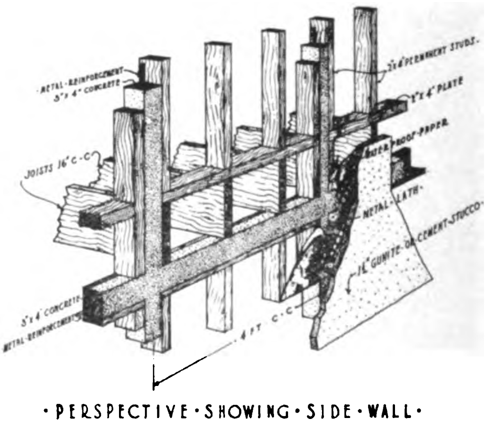


·FIRST·FLOOR·PLAN·

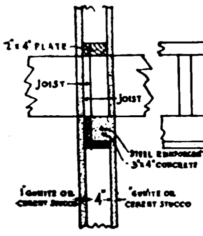
·SECOND·FLOOR·PLAN·



·PLAN·OF·OUTSIDE·WALLS·



·PERSPECTIVE·SHOWING·SIDE·WALL·



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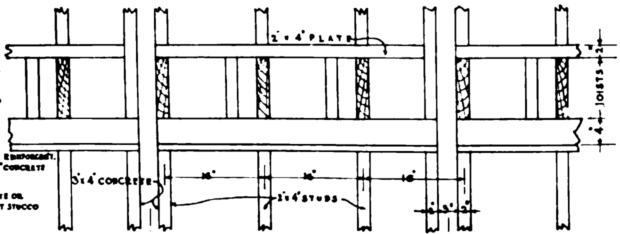
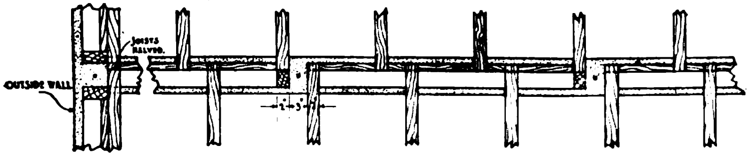
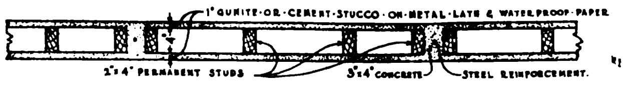


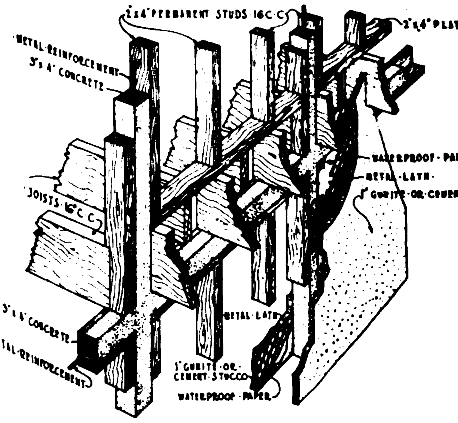
·ELEVATION·SHOWING·PARTY·WALL·FRAMING·
(·FOR GUNITE OR CEMENT·STUCCO·WITHOUT FORMS·)



·PLAN·OF·JOISTS·PARTY·WALL·



·PLAN·OF·PARTY·WALL·

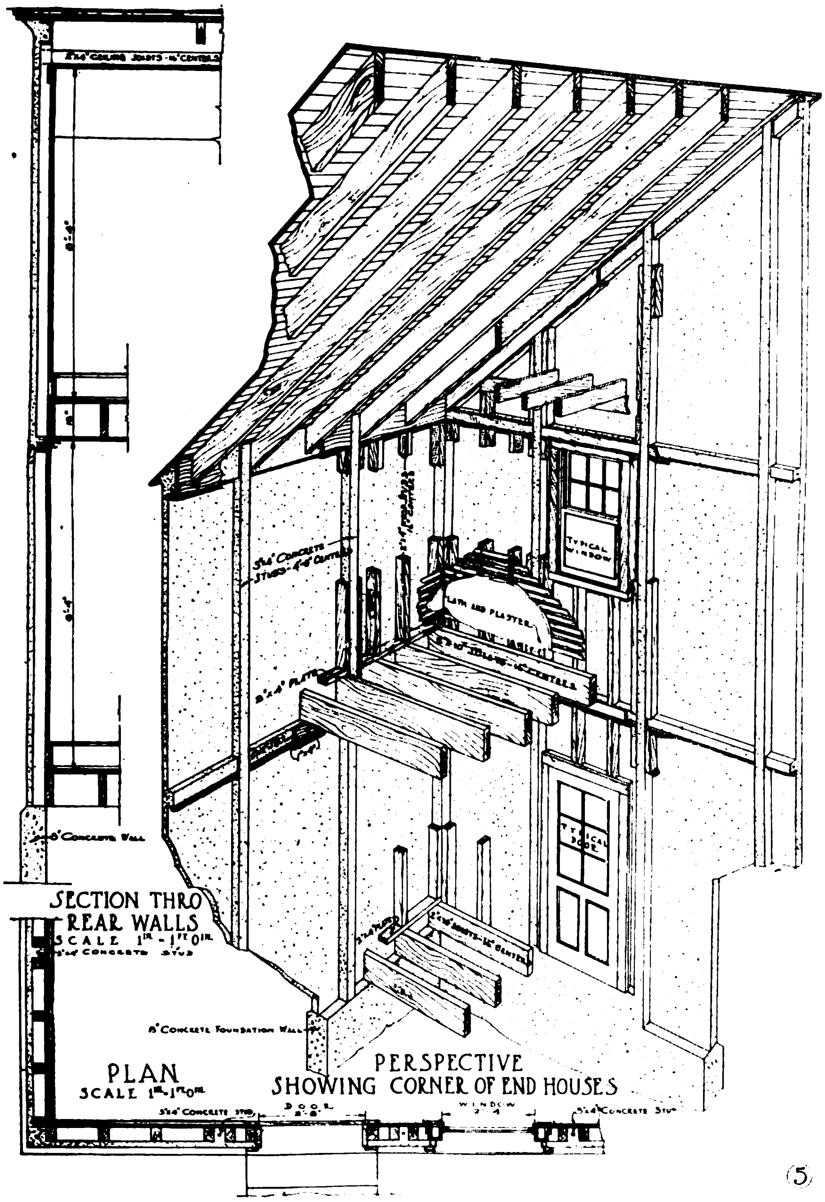


·PERSPECTIVE·SHOWING·PARTY·WALL·

surfaces may be wire lathed and cemented just the same as the exterior.

In this form of construction the expensive wood forms for concrete are eliminated, thereby making a saving of lumber and labor.

After the cellar is excavated a concrete foundation



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wall is built in the usual manner of pouring concrete from a travelling mixer, with loader, into wood forms made in panels so as to be easily removable. The first floor wood joists are then set in place on the foundation wall. On these a wood frame, consisting of studs, joists and rafters, is erected in the customary manner of building the skeleton of a frame house. Every fourth stud is doubled, allowing a 4 in. x 4 in. space between, which is filled with concrete to form a concrete stud. At the second floor and roof levels a ledgerboard, with bottom attached, is placed over the studs and so arranged that the concrete studs, when completed, will be continuous from foundation to roof. On top of the lower ledgerboard the second floor joists are set, then the second story studs, and so on. When this frame is completed, including the party wall, and the roof is on, heavy waterproof paper is nailed to the outside of the exterior wall studs, leaving the space between the doubled studs open to receive the concrete. Over the waterproof paper the wire lath, or concrete reinforcement, is stretched. The concrete studs are reinforced with steel rods fastened to the wire lath. The ledgerboard have a bottom wood piece or form so that when filled with concrete they act as beams to carry the floor joists and roof rafters. The wood studs act in the dual capacity of supporting the cement stucco while it is being applied and as furring strips in the finished building.

Everything is now ready to apply a 1½ in. to 2 in. thick concrete coating to the exterior by means of the cement gun, fillling the space between the doubled studs to form the continuous vertical concrete stud. If, for any reason, the cement gun is not available, the continuous vertical studs and ledgerboards can be poured with concrete and the exterior wire lath coated with 1:2 cement mortar by hand. The concrete is 33 per cent. denser than ordinary poured concrete and about twice as strong. Color effects may be obtained

(Continued on page 59)

Safeguarding America Against Fire

TITLED as above the National Board of Fire Underwriters has issued a bulletin of unusual interest, and one that might profitably be studied by every property owner or prospective property owner in the land.

The bulletin summarizes the fire losses of the United States for 1916, classifying them according to States, and causes, these latter in turn being divided into groups, termed "strictly preventable"; "partly preventable" and "unknown."

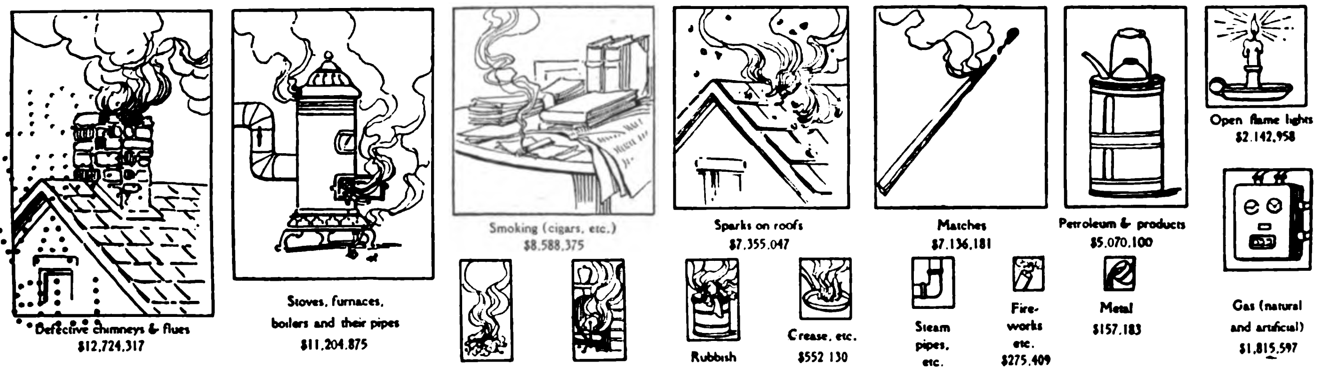
The table is shown upon the opposite page, as well as a series of illustrations graphically showing the main causes for fires.

As might be imagined, wood shingle roofs constituted one of the most prolific causes of fires, and taken in conjunction with defective chimneys and flues, with which they are closely allied, are responsible for over $20,000,000 of the country's total fire loss in the twelve months reviewed.

Commenting upon this combination of hazards the bulletin says:

Some of the fire causes are difficult to separate fully and clearly. Thus, the $12,724,317 of loss from defective chimneys and flues and the $7,355,047 from sparks on roofs, are closely associated. Both of them call special attention to the shingle roof hazard, which is also so large a factor in nearly every conflagration. This hazard is present in inexcusable degree in every part of the country, but in the southeastern section of the United States it is especially marked. For example, not long ago, a representative of the National Board spent a day in the fire headquarters of a Southern city of 35,000 people, and took account of the nature of the alarms which came in while he was present. Out of a total of sixteen, one proved to be a false alarm, but the other fifteen were for genuine fires, of which fourteen were shingle roof fires. In this section, the use of low grade shingles is extensive. Such shingles swiftly deteriorate when exposed to the weather, and give a ready lodging place to sparks, which fact, in view of the large use of wood for fuel, makes this danger excessive in many of the Southern States.

STRICTLY PREVENTABLE FIRE CAUSES—$60,466,054



Defective chimneys & flues
$12,724,317

Stoves, furnaces,
boilers and their pipes
$11,204,875

Smoking (cigars, etc.)
$8,588,375

Sparks on roofs
$7,355,047

Matches
$7,136,181

Petroleum & products
$5,070,100

Open flame lights
$2,142,958

Gas (natural
and artificial)
$1,815,597

Ashes, etc.
$1,140,194

Open fires
$1,112,953

Rubbish
$777,559

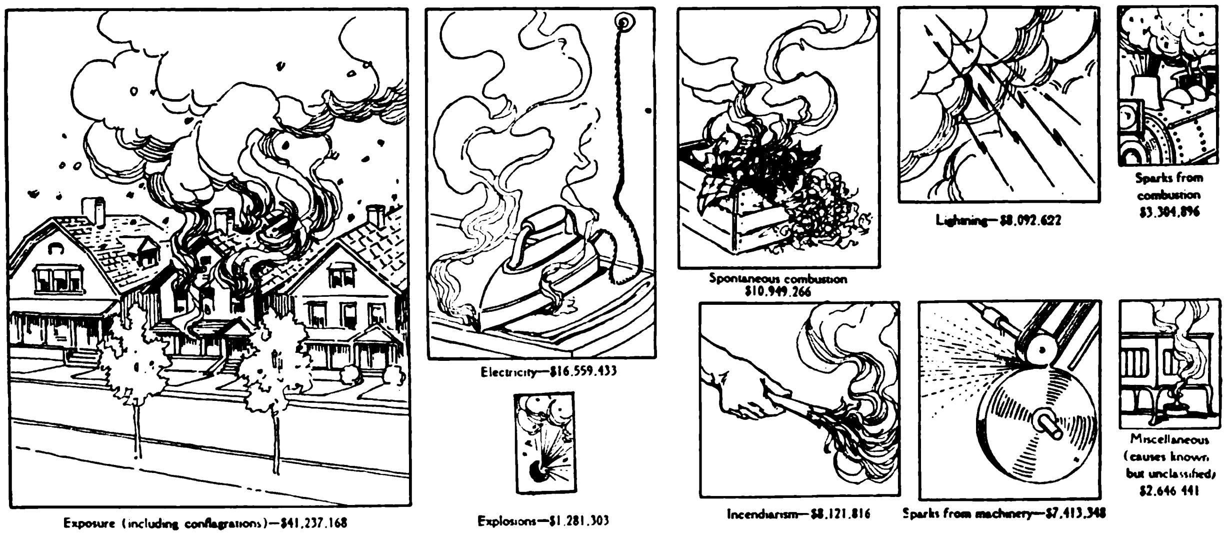
Grease, etc.
$552 130

Steam
pipes,
etc.
$413,176

Fire-
works
etc.
$275,409

Metal
$157,183

PARTLY PREVENTABLE FIRE CAUSES—$99,606,293



Exposure (including conflagrations)—$41,237,168

Electricity—$16,559,433

Explosions—$1,281,303

Spontaneous combustion
$10,949,266

Lightning—$8,092,622

Sparks from
combustion
$3,304,896

Incendiarism—$8,121,816

Sparks from machinery—$7,413,348

Miscellaneous
(causes known
but unclassified)
$2,646 441

UNKNOWN FIRE CAUSES (Probably largely preventable)—$48,632,993

COST OF FIRES BY CAUSE IN THE UNITED STATES IN 1916

	STRICTLY PREVENTABLE CAUSES.															PARTLY PREVENTABLE CAUSES											
	Defective chimneys and flues	Fireworks, firecrackers, etc.	Gas, natural and artificial.	Hot ashes and coals	Ignition of hot grease, oil, tar, wax, asphalt, etc.	Hot or molten metal	Matches.	Open fires.	Open flame lights.	Petroleum and its products.	Rubbish and litter.	Smoking (cigars, cigarettes, pipes, etc.)	Sparks on Roof.	Steam and hot water pipes.	Stoves, furnaces, boilers and their pipes.	Electricity.	Explosions.	Exposure. (Including Conflagrations.)	Sparks—from machinery.	Incendiarism.	Lightning.	Miscellaneous known causes.	Sparks—from combustion.	Spontaneous combustion.	Unknown causes (probably largely preventable).	Total.	
Alabama	$ 237,568	$ 2,947	$ 9,425	$ 41,960	$ 19,440	$ 3,800	$ 40,233	$ 20,845	$ 5,623	$ 66,175	$ 3,096	$ 92,357	$ 467,554	$ 83	$ 60,806	$ 147,638	$ 5,238	$ 371,621	$ 54,743	$ 216,414	$ 40,965	$ 14,089	$ 84,355	$ 11,478	$ 1,229,988	$ 3,258,767	Ala.
Arizona	18,908	1,672	5,644	5,862	285	...	8,839	419	2,413	30,653	...	23,674	4,607	19	14,414	54,181	1,016	64,230	57,096	22,659	2,376	622	2,267	72,308	63,810	458,004	Ariz.
Arkansas	296,405	839	5,969	10,738	693	1,366	86,809	6,898	12,735	26,233	11,983	25,547	163,301	...	85,647	199,600	6,559	194,789	70,157	216,777	57,215	22,524	163,598	62,665	753,152	2,482,199	Ark.
California	464,444	13,073	63,235	12,852	40,000	1,930	173,859	101,647	108,129	441,581	9,473	551,265	261,824	1,677	238,579	1,049,235	99,503	1,242,353	356,410	436,846	9,338	57,094	102,851	264,256	1,461,670	7,563,124	Calif.
Colorado	91,503	7,679	767	19,666	2,117	43	32,947	1,373	7,200	43,399	7,969	82,703	43,963	307	85,832	133,899	11,176	98,676	5,404	39,651	40,961	7,527	18,194	26,803	184,254	994,002	Colo.
Connecticut	224,125	7,156	6,874	13,075	13,584	150	75,948	20,821	24,678	44,592	23,399	219,953	77,915	3,830	264,283	204,779	11,608	338,250	43,197	82,706	106,261	32,660	17,523	222,741	1,196,420	3,276,527	Conn.
Delaware	9,888	59	264	8,491	4,182	29	1,602	173	1,379	5,913	2,871	187,631	2,229	11,591	14,478	4,268	54	172,371	5,402	5,321	8,893	744	14,345	29,736	97,698	589,612	Del.
Dist. of Columbia	12,473	59	3,235	4,516	369	53	18,988	290	1,543	6,571	992	242,605	169	...	3,321	14,227	1,904	6,754	12,468	5,426	407	598	837	3,494	44,192	385,490	D. C.
Florida	157,117	1,831	2,040	17,578	304	372	25,957	11,567	13,213	105,606	1,574	172,605	183,012	...	55,337	78,325	13,110	405,951	171,480	187,880	28,078	18,842	147,529	39,581	594,590	2,433,450	Fla.
Georgia	315,812	7,646	10,281	82,308	3,838	695	118,524	84,809	9,458	61,239	8,109	119,154	366,544	16,773	85,515	217,332	9,376	4,414,729	340,177	356,795	182,892	49,482	343,081	62,459	1,872,325	9,089,353	Ga.
Idaho	88,046	379	595	1,079	1,340	...	18,412	85	2,322	25,635	847	29,615	63,177	...	174,834	97,003	17,242	30,783	...	19,313	3,148	7,772	4,340	30,958	135,426	752,351	Ida.
Illinois	927,353	20,886	65,486	57,867	75,769	6,330	529,006	49,674	192,602	270,985	92,863	628,029	461,000	6,426	703,660	1,485,579	35,699	1,922,621	1,273,713	467,580	843,262	163,476	115,959	1,233,324	2,553,047	14,182,255	Ill.
Indiana	317,337	14,585	11,831	17,519	7,892	7,483	103,304	24,373	19,035	142,876	10,934	83,001	378,015	43,997	312,899	419,564	4,378	459,948	184,940	307,580	279,506	55,122	39,947	230,319	893,107	4,374,492	Ind.
Iowa	331,332	6,083	36,122	31,269	2,502	328	101,315	13,330	21,617	103,285	53,609	125,648	230,907	4,059	365,031	1,083,086	44,628	812,116	15,632	93,749	404,941	33,159	37,890	365,119	721,460	5,068,217	Ia.
Kansas	209,583	813	56,703	4,606	964	1,916	183,551	7,234	18,145	103,320	13,308	90,486	185,487	8,956	111,460	115,903	35,446	383,008	23,235	116,346	302,662	68,705	16,621	216,258	837,692	3,111,408	Kans.
Kentucky	330,306	3,306	18,269	21,121	6,010	556	69,936	20,867	21,874	38,060	1,915	94,958	202,373	8,249	233,009	127,388	7,074	427,958	135,533	126,699	96,600	165,581	88,181	41,728	943,484	3,231,035	Ky.
Louisiana	193,429	1,619	33,683	19,633	3,812	81	35,381	24,712	4,911	81,547	6,427	67,947	203,335	341	86,401	155,576	3,746	484,130	154,879	198,181	296,061	45,356	174,145	27,377	667,207	2,969,917	La.
Maine	365,642	853	6,650	9,562	5,939	38	64,334	30,418	7,644	55,386	10,459	110,574	64,751	1,363	183,595	115,165	3,331	373,384	60,492	62,856	52,614	64,537	70,491	228,499	344,272	2,292,854	Me.
Maryland	155,645	1,013	4,975	38,342	3,364	1,300	95,677	2,579	13,876	26,292	3,178	124,920	34,972	784	123,605	132,157	2,932	234,286	749,346	40,360	51,958	17,962	5,779	92,777	802,425	2,760,504	Md.
Massachusetts ..	438,339	16,208	58,361	110,687	39,564	6,796	594,040	69,251	106,356	218,356	78,098	739,719	144,703	25,643	494,453	1,078,443	25,290	1,775,925	187,457	439,437	275,936	121,523	64,590	729,218	1,852,510	9,691,408	Mass.
Michigan	402,133	8,497	48,011	20.657	14,867	11,594	234,217	30,597	374,504	139,864	12,098	183,716	338,552	17,890	502,264	1,020,406	124,686	950,220	298,117	317,444	153,336	43,406	72,292	435,742	847,995	6,593,105	Mich.
Minnesota	257,840	5,141	25,094	11,753	4,297	1,581	400,764	80,949	43,854	132,154	34,404	320,624	121,562	3,557	544,108	374,180	19,817	1,049,868	131,654	207,973	118,257	23,850	67,939	400,018	742,556	5,124,094	Minn.
Mississippi	262,972	302	2,117	31,956	10,562	6,534	22,266	41,414	8,121	37,383	772	47,683	290,973	8,074	135,906	88,846	2,736	341,347	17,735	230,299	231,275	38,848	108,302	87,078	547,299	2,590,800	Miss.
Missouri	539,120	7,392	36,617	80,716	13,148	998	261,673	10,663	34,526	90,211	58,576	110,939	184,932	1,357	422,830	720,742	30,304	783,770	34,886	250,183	288,906	84,552	30,014	435,815	1,123,579	5,636,348	Mo.
Montana	129,277	3,692	346	10,304	2,707	229	25,134	3,257	6,716	63,330	317	59,652	128,174	28,902	203,605	48,088	8,843	186,728	6,731	58,755	22,686	11,910	99,310	60,116	382,447	1,551,256	Mont.
Nebraska	100,821	1,844	2,352	6,214	1,133	72	137,202	1,530	37,842	123,429	1,047	83,612	40,657	3,100	173,329	194,852	21,526	207,910	339,402	105,295	237,125	20,722	8,077	145,063	836,274	2,830,370	Nebr.
Nevada	7,803	10	218	...	...	...	3,181	...	880	10,001	675	20,719	5,941	...	10,426	31,843	...	100,186	...	42,110	...	486	17,604	346	28,006	280,435	Nev.
New Hampshire	124,094	142	2,211	5,977	1,926	54	36,717	635	6,098	36,055	815	66,007	21,535	6,340	58,277	136,227	16,064	177,959	21,761	38,449	75,604	7,559	9,820	17,659	258,322	1,126,307	N. H.
New Jersey.....	355,567	1,417	117,117	28,445	17,800	7,002	308,238	14,200	115,627	338,757	13,782	453,406	93,586	54,994	552,604	638,660	79,996	3,280,366	82,852	176,002	178,751	89,939	77,673	535,442	2,771,979	10,384,202	N. J.
New Mexico....	32,317	224	2,603	3,758	56	37	6,294	3,389	2,063	5,580	680	9,761	7,156	702	14,044	19,930	4,367	146,755	...	11,162	3,959	1,422	751	4,079	68,895	350,014	N. M.
New York.......	1,031,563	41,367	382,754	141,641	88,387	36,014	1,400,100	161,336	358,175	580,901	28,232	1,374,615	359,968	29,537	1,282,309	1,324,282	237,907	4,433,210	229,948	650,730	694,702	368,312	141,406	1,108,074	8,329,392	24,814,762	N. Y.
North Carolina..	138,238	33	11,819	10,710	2,615	72	56,444	19,703	2,277	48,157	69,856	38,225	143,533	6,776	62,509	61,441	360	377,409	100,524	108,291	126,798	76,227	196,535	382,775	668,662	2,690,989	N. C.
North Dakota...	77,622	...	4,143	8,226	4,524	...	40,091	752	33,419	76,702	412	110,924	3,483	8,748	241,855	44,455	62,435	486,465	85,126	44,501	105,565	20,293	12,584	39,059	187,097	1,648,471	N. D.
Ohio	390,093	7,586	192,361	15,337	32,903	5,115	252,879	38,897	123,874	170,006	84,619	365,971	431,641	4,074	431,120	708,100	28,743	1,022,510	334,815	334,096	478,155	45,769	162,807	481,665	1.617,122	7,660,283	Ohio
Oklahoma	226,911	2,650	33,850	28,078	1,780	1,808	112,442	6,421	4,741	106,445	3,278	69,520	67,902	157	67,529	103,066	13,411	479,107	131,175	290,204	762,660	22,247	12,308	130,245	589,963	3,267,698	Okla.
Oregon	179,379	588	6,472	3,900	5,065	217	26,767	6,083	11,941	31,306	1,843	82,488	46,073	14,733	231,063	142,295	13,472	224,961	118,929	51,202	14,569	82,438	101,342	40,787	439,580	1,878,092	Ore.
Pennsylvania ..	771,101	36,543	363,407	39,569	56,204	19,069	635,176	52,851	221,765	333,449	23,696	621,681	283,860	37,869	749,344	1,398,847	139,181	2,045,669	225,115	438,005	302,994	208,304	72,821	703,476	3,751,221	13,531,217	Pa.
Rhode Island...	126,618	1,161	3,802	8,091	1,574	82	37,796	23,953	24,445	49,021	4,730	68,298	94,034	9,099	86,664	153,090	6,803	222,159	578,093	43,921	38,654	75,638	12,109	59,450	550,820	2,290,114	R. I.
South Carolina..	171,049	2,558	251	20,635	383	4,216	57,017	41,683	920	39,715	1,367	98,740	278,152	...	54,217	149,785	2,648	397,321	25,136	92,505	27,669	21,210	27,205	9,731	662,674	2,186,787	S. C.
South Dakota...	140,199	222	199	621	2,521	75	26,065	7,929	5,754	76,479	2,030	31,850	5,783	...	142,917	99,868	29,985	133,503	45,503	8,170	109,607	2,880	14,853	45,839	133,641	1,065,481	S. D.
Tennessee	391,910	113	12,478	25,906	15,551	3,223	132,682	21,680	17,662	70,051	16,090	103,220	219,458	71	102,622	249.484	14,779	1,562,932	39,263	202,154	213,530	175,383	193,508	49,776	880,013	4,713,569	Tenn.
Texas	415,745	13,948	71,825	33,164	3,577	3,337	125,237	25,089	39,278	307,580	15,967	196,379	109,259	18	400,018	712,440	30,105	6,594,556	389,724	391,634	387,157	87,553	58,703	326,036	2,341,542	13,079,871	Tex.
Utah	36,947	27	123	4,045	2,287	15	10,251	7,783	13,907	7,961	1,114	18,117	13,773	...	32,655	46,100	209	27,835	404	17,406	13,906	2,446	2,425	56,193	97,937	413,911	Utah
Vermont	43,817	13	305	7,713	628	10,917	13,610	343	2,095	7,244	...	12,779	10,297	...	27,646	55,427	7,839	30,158	6,926	5,161	2,519	52,533	23,365	20,222	160,343	501,800	Vt.
Virginia	205,961	26,807	1,194	11,765	559	7,176	56,678	5,652	7,124	36,640	12,274	113,884	92,003	27,653	232,973	145,059	2,184	691,812	140,137	176,666	90,258	36,502	32,950	114,020	1,076,315	3,344,346	Va.
Washington	522,009	1,349	15,495	11,504	20,578	179	156,933	24,832	17,154	119,743	10,930	81,374	76,566	3,635	357,584	174,815	6,292	386,242	13,176	128,065	15,778	22,304	111,302	215,351	1,227,194	3,720,384	Wash.
West Virginia..	140,900	17	55,924	25,552	8,571	55	69,638	5,445	12,437	43,118	2,882	8,703	10,438	3,302	95,785	197,485	9,635	261,021	17,155	190.253	42,108	11,409	75,864	39,344	370,710	1,697,751	W. Va.
Wisconsin	309,349	2,736	16,977	12,756	6,009	4,347	101,364	43,548	19,648	89,702	3,817	114,975	331,330	3,480	253,606	595,304	25,885	404,387	145,442	61,815	271,021	62,102	27,377	1,014,597	630,108	4,581,682	Wis.
Wyoming	7,202	25	5,193	2,440	50	...	10,665	984	1,358	1,333	53	8,122	14,495	...	17,907	10,963	1,756	16,920	1,838	6,859	2,009	2,832	22,126	170	51,928	187,223	Wyo.
	$12,724,317	$275,409	$1,515,597	$1,140,194	$552,130	$157,183	$7,136,181	$1,112,953	$2,142,958	$5,070,100	$777,559	$8,583,375	$7,355,047	$413,176	$11,204,875	$16,559,433	$1,281,303	$41,237,168	$7,413,348	$8,121,816	$8,092,622	$2,646,441	$3,304,896	$10,949,266	$48,632,993	$208,706,340	

Prevention of Corrosion in Iron and Steel in Reinforced Concrete

IN a paper on "Corrosion of Iron and Steel with Special Reference to Reinforced Concrete," recently read before the Concrete Institute (British) by Dr. J. Newton Friend, the author, after a historical survey of the subject of iron and its uses and the early records extant on the subject of corrosion, submitted the following facts bearing on the cause of rust formation:

"Water, alone, is without appreciable action upon iron at ordinary temperatures." This he illustrated by tubes exhibited containing iron and air-free water, hermetically sealed 11½ years ago. Apart from the merest trace of tarnishing, which could only be detected under a powerful light, the metal appeared to have undergone no change whatever.

"Water vapor is without visible action upon iron at ordinary temperatures. Iron might be heated for prolonged periods in steam up to about 300 deg. C. without undergoing any apparent change. At 350 deg. C. and somewhat above, ferrous oxide was produced, the surface of the metal being tarnished and gaseous hydrogen evolved. At still higher temperatures magnetic oxide of iron resulted and formed a skin on the surface of the metal, which tended to protect the underlayers from attack. This, however, was but rusting in the ordinary acceptation of the term. It was oxidation, and was the principle of the Barff process of protecting iron from corrosion."

From the foregoing it was clear that oxygen and liquid water were essential to corrosion.

After a few remarks upon the chemical nature of rust the author proceeded: At ordinary temperatures a very dilute solution of sodium carbonate is considerably more corrosive than tap water. But if the concentration be increased to 0.25 per cent. and above, the metal is entirely protected from rusting. Similarly, a 3 per cent. solution of common salt at about 10 deg. C. is much more corrosive than tap water at the same temperature, but as the temperature rises the relative corrosivity falls, so much so that at 21 deg. C. the solution is appreciably less corrosive than tap water. Since sea water contains some 3 per cent. of sodium chloride it is of interest to note that at 18 deg. C. (64 deg. Fahr.) and above, all dilutions of sea water are less corrosive than tap water, while at lower temperatures they are more corrosive.

Effect of Alkalies

For many years it has been known that alkalies, if present in sufficient concentration, will completely inhibit corrosion. Should, however, large supplies of air gain access, carbonates are produced and these greatly accelerate corrosion unless the concentration of alkali is sufficiently great to yield 0.25 per cent. solution of carbonate. Lime, of course, behaves similarly to caustic soda or potash. Hence, in attempting to protect iron permanently with free alkalies, such as lime, it is necessary to consider, not merely the protection afforded by fresh caustic lime, but that which will be afforded when the atmosphere has converted the lime into carbonate.

An interesting case arises when iron is immersed in alkaline solutions containing inorganic salts. For example, iron will remain bright in a 1 per cent. solution of caustic potash for an indefinite time, but upon addition of potassium chloride corrosion readily takes place. It is possible, however, to increase the alkali to such an extent that corrosion is entirely prevented, no matter how concentrated the solution of chloride. The minimum amount of alkali required rises with the percentage of chloride until saturation of the latter is reached.

A curious point about this type of corrosion in alkaline solution is the fact that it invariably takes the form of pitting. Most probably the pitting originates at points where traces of impurity are present. These traces are exceedingly difficult to remove, and are readily found on etching the surfaces of even the purest commercial irons.

These observations demand the serious attention of boiler engineers, inasmuch as weakly alkaline feed waters are likely to produce serious trouble. It is not difficult to imagine that a large iron boiler might very well lose several pounds in weight through a uniform superficial corrosion and not be seriously affected thereby. Yet if a hole were caused by pitting the effect might be disastrous, even though the total loss in weight were only half an ounce. The remedy in these cases appears to lie in increasing the alkalinity.

Preserving Iron in Concrete

From the foregoing it is evident that the preservation of iron in concrete may be effected in one or more of three ways, namely:

By complete exclusion of air;

By complete exclusion of water;

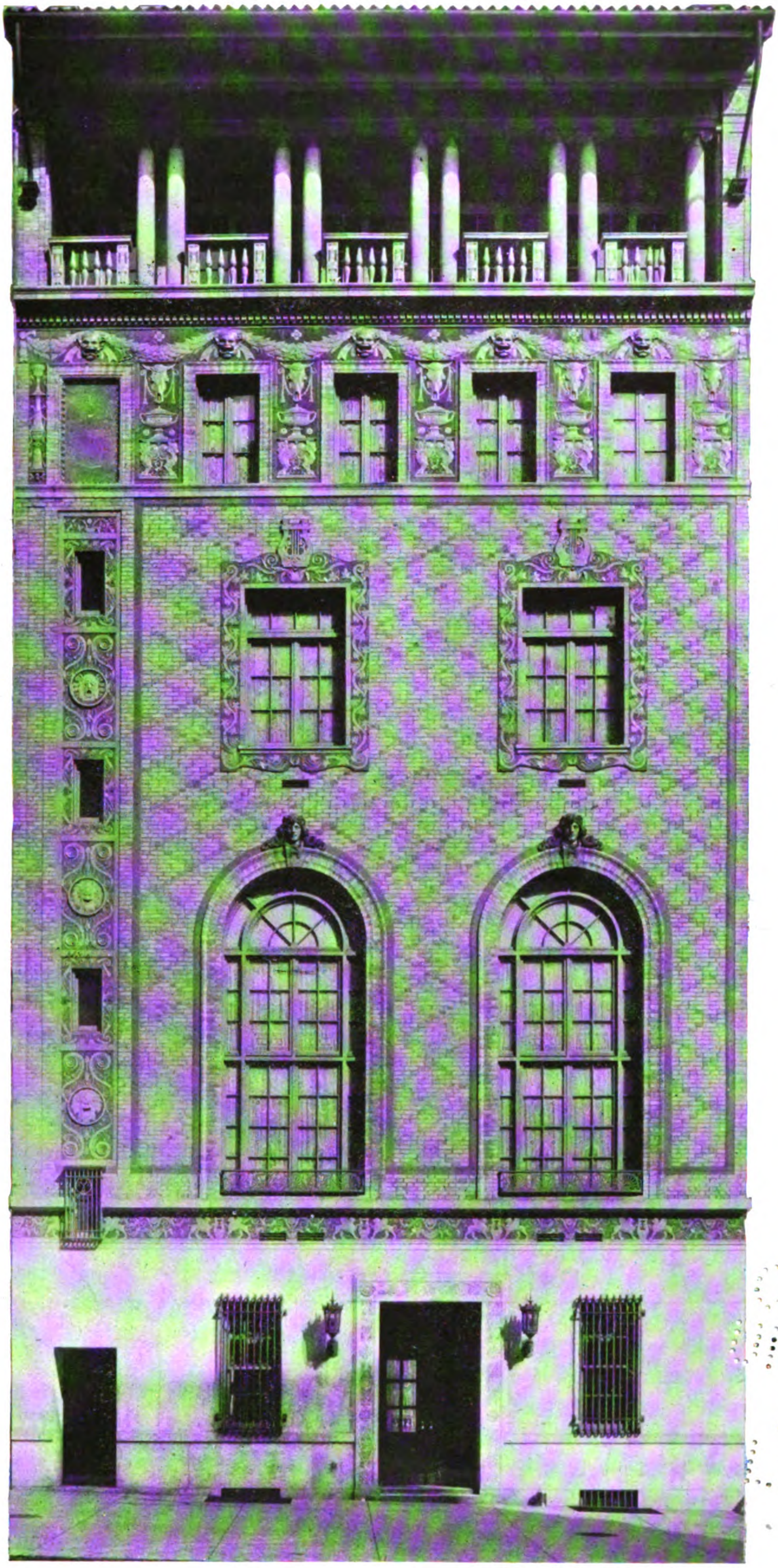
By rendering the concrete sufficiently alkaline to place it within the inhibiting area.

If the engineer can make his concrete conform perfectly to any one of these conditions he has achieved his object, for the reinforcing metal will not rust.

The following considerations suggest themselves as worthy of careful study:

None of the concrete materials should be too coarse, otherwise thorough mixing and good contact between the different ingredients will not be as perfect as is desirable.

(Continued on page 57)



G. A. & H. Boehm, Architects.

CHALIF STUDIO, NEW YORK CITY

Through the Use of Brick Facing and Ornamental Terra Cotta Trim This Recently Completed Building is Admittedly One of the Most Attractive Structures in the Metropolis

A Department Devoted to the Use of

AUTOMATIC SPRINKLERS

Edited

IRA G. HOAGLAND, Secretary **PAUL MASON, Special Representative**
National Automatic Sprinkler Association

Automatic Sprinklers as a Safeguard for School and College Buildings

RECENT fires in a number of school buildings—for it seems that the schools of the country are still to a large degree built to burn—some of them accompanied by loss of life, direct attention again and with renewed emphasis to the fact that automatic sprinkler protection is the only efficacious method of safeguarding school buildings, especially of the older type, and the further fact that this protection is almost completely lacking. What is true of schools also is true of hospitals, for recently more than 60 children lost their lives in a convent hospital in Canada. What would save the schools would have saved these lives.

The recent fire at Vassar was only a repetition, on a slightly different scale and differing somewhat in details, of the fire at Wellesley, five years ago. In the Wellesley fire the fire drill system enabled the girl students to save their own lives, and in the Vassar fire the fire drill system enabled the girl students to hold the blaze somewhat in check until the arrival of the fire department. Provision of a sprinkler system, in either of these institutions, would have made these efforts unnecessary, and would have safeguarded the lives and saved the buildings.

Three Factors of Disaster

In virtually all institutional fires, unsound construction, poor protection and inadequate water supply are the criminal triplets foredooming to disaster. Run the entire gamut of school fire disasters (and most of the hospital fire disasters), and it will be found that at least two of these conditions were contributing factors; and in most instances the third. In the case of the large institutions—nearly always outside the municipality, surrounded by large grounds, perhaps hundreds of acres—inadequate water supply almost invariably is added to hazardous construction and poor protection, coupled with remoteness from municipal protection.

This was the case at Wellesley; and the other day was the case at Vassar. At Vassar the girl students chopped holes in the ice to supply suction facilities to the engines and thus relieve the low hydrant pressure situation; at Wellesley there was no opportunity for this kind of reinforcement; but otherwise conditions were about the same, and this one variant may have had an influence in determining that the loss at Vassar should be less than half that at Wellesley.

But automatic sprinkler systems, properly installed, rigidly maintained and with ample water supplies, would have prevented both losses.

Wellesley College Fire

Poor construction and protection of the building (College Hall) at Wellesley formed a decided contrast to the efficacy of the fire drill, which enabled the emptying of the building in four minutes. This was one of the original buildings of the college, erected in 1871, and was four and five stories in height, 480 feet long, 44 feet wide, and had several wings. It was of brick construction, with mansard roof—gravel and slate—on wood joists. Floors were of single and double boards; stairs and elevators open, and there was also an extensive vertical opening through the entire center of the building. A corridor, 12 feet wide, extended the entire length, on all floors. Corridor side walls were of brick, but all doors were of wood. There were no cut-offs. Interior finish was largely of wood, much of it highly varnished. Numerous concealed spaces were features of the construction.

All these defects were vital; but undoubtedly no one of them would have been sufficient to nullify the effectiveness of automatic sprinklers, had they been provided, and probably no two of them would have nullified it, unless it was the combination of concealed spaces and vertical and horizontal openings. The records of the National Fire Protection Association for more than 20 years show that whereas sprinkler control of fire is unsatisfactory in only 4.53 per cent. of all known cases, structural defects are responsible for more than one-fourth of this percentage, and concealed spaces and vertical openings for about one-sixth of the number involving faulty construction.

Present Conditions Little Better

Low water pressure prevented use of the meager protective equipment within the building (two standpipes and hose systems near opposite ends), and delay in opening a water gate which would have allowed city water to augment pressure from the college pumping station resulted in letting the blaze gain such headway that no subsequent increase of pressure could have coped with it.

The result was a property loss well upward of a million and an incalculable loss in scholastic equipment, books and records and administration papers; all of which could have been prevented by the installation of standard automatic sprinklers, properly maintained and with adequate water supplies.

It is of interest to note that while College Hall has been replaced with a modern fire-resistant building, the college water supply has been augmented by a 12-inch main and a few large hydrants have been installed, there are still many buildings at Wellesley which are ripe for the same experience, and the hydrants, in the main, are so badly distributed that with two or three exceptions they would be of little value.

What Happened at Vassar

The fire at Vassar was similar in almost every detail, except that the students were at dinner when the blaze developed, instead of in their rooms. It was the main building, the oldest in the College, built in 1861, and was similar in construction to College Hall at Wellesley, but not so large. Construction was of brick, wood frame, four stories high, with mansard roof with slate facings on wood joists. Fire broke out in the servants' quarters on the fourth floor of the east wing, and spread rapidly both up and down.

Four hundred girls were at dinner on the second floor. They responded promptly to the fire alarm, those assigned for service going to the fire apparatus and the others leaving the building without confusion. Water pressure was so low that no effective hose streams could reach the fire, and when the Poughkeepsie fire department responded, the pumping engines could not draw enough water from the hydrants to furnish adequate volume and pressure. So a dozen girls chopped holes in the ice on Pratt Lake, through which suction was taken.

It was too late, however, to save the east wing, and about the best that could be done was to keep the blaze from spreading to the center of the building. The wing was gutted.

Sprinklers Would Have Saved It

Here again automatic sprinklers would have solved the fire problem before it was precipitated, and under slightly more favorable circumstances than at Wellesley. Open areas were not so large or numerous; vertical and horizontal openings were less numerous and consequently constituted a less serious menace; there were not so many concealed spaces and the building was not so high. Sprinklers, therefore, could have operated under more favorable conditions.

Sound construction in school houses and college buildings should be enforced, as a matter of course; but there are many old buildings, of hazardous construction, of which these two were typical. They cannot be rebuilt, but they should be protected. What applies to the college building applies also to the city school, where the chief danger of fires originating is in the heating system in the basement. Fire Chief George L. Johnson, of Waltham (Mass.), has solved the problem for the Waltham schools by having the basements of the five most hazardous buildings sprinklered, at a total cost of about $18,000.

Chief John P. Doyle, of Wellesley (who became chief soon after the Wellesley College fire), will solve the Wellesley problem this year by having four or five of the most hazardous public school buildings protected in the same manner. More complete equipment would be necessary in the two colleges, but the responsible authorities of Wellesley and Vassar might profit greatly by applying to the lesson of their own short-comings the prescience of the school authorities of these two municipalities under the guidance of their progressive fire chiefs.

Prevention of Corrosion of Iron and Steel in Reinforced Concrete

(Continued from page 54)

It is essential to press or pun the mixture well into position in order to eliminate voids in so far as is possible.

A sufficient thickness of concrete should be applied to the metal. If too thin the concrete may not be sufficiently impervious or it may crack mechanically and thus admit air and water to the metal.

Stray electric current must be avoided. If the metal should become anodic, rusting would take place in consequence of the liberation of oxygen, and this, leading to cracking, would rapidly destroy the cement.

Substances likely to contain acids or acid-producing bodies should be avoided.

The concrete may be advantageously coated with some waterproofing material to render it still more impervious, provided such proofing is entirely free from acid or acid-producing substances.

Fire Waste in Canada

SUMMARIZING the results ofq an exhaustive investigation into the fire loss of Canada, the Commission of Conservation, recommended remedial legislation along the following lines:

Planning of cities and towns with the object of restricting hazardous pursuits to delimited areas.

Provision of adequate water and fire-fighting facilities.

Proper building requirements.

Control of hazards, close inspections and rigid enforcement of regulations.

Enactment of a fire marshal law.

SAFE HOMES

Edited by **RALPH P. STODDARD, Secretary**
Society Advocating Fire Elimination

Fire-Safe Homes for Industrial Workers

As a result of the rapid expansion experienced in most every industrial city of any size and the resulting shortage of housing accommodation for the great influx of labor it attracts, plans are being laid this season for housing operations, to begin with the first seasonable weather, which will dwarf any such activities in the past.

Most conspicuous of these, of course, is the plan of the Federal Government, acting through the Shipping Board, in the carrying out of which it is estimated close to $100,000,000 will be spent. Congress already has appropriated $50,000,000 as an initial expenditure.

This money will be expended to provide housing accommodations adjacent to the great shipbuilding plants along the Delaware river, at Newport, on the Pacific coast and elsewhere. It is reported the war department is to ask money from Congress to be used for like purposes in the vicinity of the great munition-making plants. Bethlehem, South Chicago and Youngstown are among the cities where it is understood the war department will come to assistance of industrial plants by providing living housing accommodations, which local enterprise has failed to provide.

This shortage of living quarters generally is not realized except by those directly interested. So scarce have living houses, flats, light housekeeping rooms and even beds, where a single man may sleep after the day's work, become that no wages are able to lure workmen to these cities. Every sort of inducement is offered to no avail.

These conditions are the result largely of one condition—inability to obtain from banks money with which to finance this sort of business activity. The principal reason, or better, excuse, given by bankers is "we do not consider this demand for housing other than a mushroom growth. With the ending of the war these great industries will cease to boom, the labor migrate back to other centers, where industry is more diversified. The result will be that our money will be tied up in vacant property—in short, unprofitable investments. On the other hand, we feel that the industries are themselves going enterprises. The returns upon money invested are quicker and the extensions both in buildings and machinery permanent. We feel our money should be employed in active capital, rather than in investment property."

This attitude on the part of the bankers has had its effect upon the building industry. The result has been that housing projects have been compelled almost entirely to be financed by private money. Building companies have sprung up almost over night and flourished beyond expectations. Mortgage loan companies also are taking a prominent part in the financing of housing activities.

One of the most recently organized of these companies is in Cleveland. This corporation, known as the Lincoln Housing Development Company, is backed by interests identified with J. L. Free, one of the Sixth City's most leading real estate operators. Identified with him in the enterprise is Earl J. G. Lovett, who takes into the new company a successful housing project of his own. The Lovett business, which is known as the Fire-Safe Development Company, is engaged in construction of a group of twenty-four homes in Westhaven, one of Cleveland's exclusive residence suburbs. All of these houses are of fire-safe construction and the completed operation will give Cleveland its first strictly "fire-safe allotment."

The Lincoln Company, with an initial capital of $250,000, combines with the Fire-Safe Development Co.'s project its own, which is for the erection of homes in any parts of the city, where needs of industries offer favorable opportunity. Land already has been secured in several localities and building operations will begin with the first seasonable building weather. Its newer operations will be in the field of moderate priced homes, which with the high grade Westhaven development, will give this company a hold upon the entire field of home-building. It will be prepared to meet any demand.

And this company is but one of the many which are coming to the rescue of Cleveland industries in providing housing for their help. A number of companies have been organized during the winter. Mostly they are on a somewhat smaller scale, but their aggregate of new housing accommodation will go far toward solving Cleveland's housing problem.

An aid to companies of this sort are the financing companies, which furnish the money to finance the building of homes for individuals and limited operations for companies. One of many of these is the Builders' Investment Company. In it are interested real estate men, material dealers and others identified with the building trade. It has a capital of $2,000,000, which will place it in a position to be a factor of itself in building operations in Cleveland during this year.

It is such activities as these which go far toward answering the oft asked question as to why workmen will come to Cleveland in preference to other cities, where possibly higher wages may be obtained and certainly higher wages for certain classes of work.

Concrete Stud and Cement Stucco House

(Continued from page 51)

by adding mortar stain to the concrete while it is being mixed. No further treatment of the exterior wall surface is needed. The rapidity with which this type of house may be erected is dependent only upon the number of cement guns put into simultaneous operation or, if the work is done by hand, the number of workmen employed at any one time. Particular attention is here called to several of the chief points in favor of this construction, which are: first, after the framework of any number of houses is once erected, the cement can be applied without any interruption, in contradistinction to the usual procedure of stuccoing a part of the work, then shifting the laborers and their materials to another portion while the first is being completed, and then having to shift them back again. Second, the numerous cracks so common to all other forms of concrete construction are entirely eliminated in this process, because the vertical concrete studs carry all the load so that there is no shrinkage or settlement to contend with in this monolithic structure. Party walls merely have a skim coat of white plaster applied to the cement for a finish, which makes a saving on this wall alone of at least eight cents per square foot over the usual plastered surface. Either of these two latter methods of construction compete very favorably with frame, especially now when wood is expensive and difficult to obtain.

Types of Incombustible Roofing

The roof, whether flat or pitched, lends itself very readily to concrete construction. The concrete may be applied in the same manner as herein described for the vertical walls, but the expensiveness of the concrete roof construction necessary to carry the roof itself makes it prohibitive for the type of building in which low cost is a prime essential. For the pitched roof there are numerous other good, economical and easily obtainable fire-resisting materials upon the market, including asbestos and asphalted-felt shingles, slate, so-called "Ready" and built-up roofings of felt, tar and gravel.

No other form of construction, to my knowledge, can produce a house of such low first cost, at the same time possessing the fire-resisting qualities inherent in the conventional house built with exterior party walls of brick, as the concrete-enveloped wood-framed Concrete Stud and Cement Stucco House. The essential differences in this type of house are in the wall construction, which in all other forms of masonry walls, must be completed before the floors, roof and interior partitions can be built, and which must be furred on the inside face to make an air space between the exterior wall proper and the plaster, in order to obtain a dry wall.

By standardizing the style of the houses and applying efficient methods in their erection, a row of ten two-story houses, as shown in the illustration, can be completed ready for occupancy in three weeks from the time the cellars are dug. If erected in groups, any number of rows can be built at the same time, the rapidity of the work depending only upon the number of cement guns put into simultaneous operation. When it is considered that a house can be completely concreted in two and one-half days the possibilities in rapidity of construction by this process are apparent.

Want Brick Bungalows

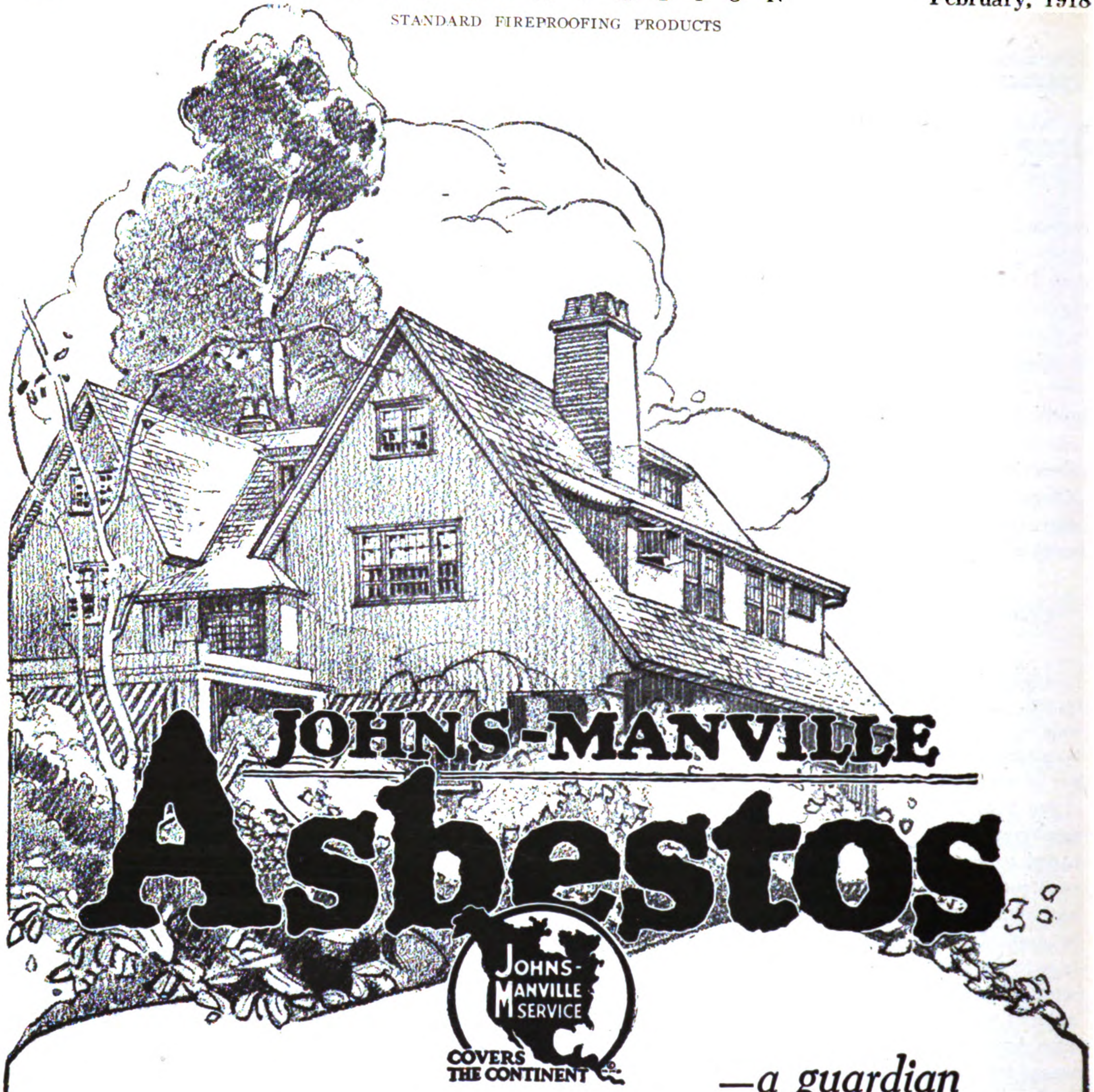
Brick bungalows are a known value and people are becoming more and more in favor of them. Down in Atlanta, Ga., they sell as fast as they can be built. The leading real estate dealer in Atlanta was interviewed on the subject of house demand and told the "Atlanta Journal" the following:

"The demand for brick veneer bungalows has been unprecedented in the history of my business," said James L. Logan, the well-known real estate dealer, Saturday.

Mr. Logan says the demand for such dwellings is especially keen for locations on the north side and that if he had a number of bungalows in this section eligibly placed on his list he could make sales of them at once.—"American Clay Magazine."

Scant Salvage in Frame Building

A FRAME house sold the other day in Bucyrus for sixty dollars, according to the "American Clay Magazine." It had to be dismantled and the material wasn't worth more than that. Suppose it had been built of brick. They are worth ten dollars a thousand and there would have been forty thousand in the house. Then there would have been other salvage besides. Brick are always good.



—a guardian

of this home through beautiful, fire-safe shingles

that for years to come will repel fire—and resist the elements without deterioration. But the transformation from the raw asbestos rock of the mines to asbestos in forms useful to Man has been the work of years. Johns-Manville has given half a century of effort to its development—first as pioneers, now as leaders. They have woven and spun, crushed, felted and moulded asbestos into a hundred forms—each applied to a need of Man—all combining to make life safer and more comfortable.

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The Fireproofing News

CONTAINING DETAILED DESCRIPTIONS OF NEW DEVICES AND APPLICATIONS OF MATERIALS WHICH ARE OF REAL VALUE IN FIRESAFE BUILDING: ALSO NOTES ON THE LATEST BOOKLETS, CATALOGS AND OTHER FIRESAFE LITERATURE, WITH OTHER ITEMS OF INTEREST TO THE FIREPROOFING FRATERNITY

LATEST EDITION

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New York City, N. Y., February, 1918

Priceless

HOW CONCRETE CAN BE MADE WATERPROOF

Many methods and ingredients have been devised for making concrete completely waterproof. In many kinds of stucco work and in concrete that need not be impervious to ordinary dampness some of these are applied to walls after they are finished. In others the waterproofing is made a part of the concrete mixture, this latter being known among masons as the integral process. About 2 per cent. of the materials used in integral waterproofing is customarily added.

The purpose of the integral addition is to supply a filler even finer than the cement which shall close the most minute parts left between the sand grains and the cement. Alum and lime are sometimes used, as are diluted soap and emulsions of oil. Soap in the water, with which cement is mixed, and alum in the concrete mixture, are supposed to act chemically upon each other and produce a totally non-porous substance. There are many integral compounds, manufactured under trade names, most of which are relied upon by masons for ordinary work.

But for cisterns, retaining walls that must withstand long and steady soaking, and floors subjected to frequent floodings no process has been found as efficacious as the application of waterproofing on the side that is subjected to the water. Of these the most satisfactory and the cheapest, where the character of the work permits of its use, is asphaltum, either as a dissolved paint or heated and applied while liquid. This may be applied with a brush, allowed to soak in, and repeated coats added till the workman is sure every pore is closed.

Another process depends upon paraffin to close all pores against moisture. The application of paraffin is a more complicated and expensive process and is not considered more effective than the asphaltum coating. It has the advantage, however, that it may be applied to stucco or other exposed surfaces without marring their appearance, and paraffin-finished walls may be painted any color desired with specially prepared paints.

In applying paraffin the surface to be covered is gone over with a gasoline torch and heated, a small area at a time, and the paraffin at high temperature blown on in a spray. The heated wall draws the liquid paraffin into every pore, and when the work is finished the surface is covered with a film of wax. Paraffin is sometimes dissolved in benzine or some other solvent and applied like paint. When this method is used several coats must be applied, each being allowed ample time to dry out.

The chemical affinity of soap and alum is the basis for another waterproofing method. Soap, preferably an olive oil or castile soap, is dissolved in hot water at the rate of four pounds to five gallons. Ten ounces of alum is dissolved in five gallons of water in another vessel. First the soapy water, at a temperature as near boiling as can be maintained, is brushed over the wall, and it should be brushed in till a smooth, unbroken surface is secured. After the soap has thoroughly dried, in from one to two days, a coating of the alum water is applied and allowed to dry. Another coat of soap and a second coat of alum finishes the job. In a short time it will be found that chemical action has amalgamated the soap and alum into a coating that thoroughly withstands water.

It will readily be seen that these processes are expensive, even the asphaltum costing from 40 to 50 cents a square yard. Hence, the builder will do well to see that his concrete is made rich enough with cement and is sufficiently firm, so that his wall will require no further waterproofing.

Many workers in cement, particularly plasterers putting up stucco or applying finishing coats to concrete walls, use lime in their plaster. An addition of lime makes the mortar more smooth and putty-like and much easier to handle, straight cement mortar being short and inclined to be crumbly. The best authorities agree that a small admixture of well-seasoned hydrated lime does not harm cement mortar if it is thoroughly incorporated. But the danger in ordinary practice is that the lime will be allowed to run through the mortar in lumps. A lump of lime, even though it be no larger than a pinhead, will absorb water, while the surrounding cement remains dry.

Freezing weather is likely to expand the moisture in the lime and cause it to spoil the surface of the work. Sometimes a job that is perfectly smooth in the fall will be pockmarked and pitted after a winter's freezing as though it had been shot with tiny steel bullets.—*New York Times.*

Natco on the Farm

Farmers who plan the erection of buildings upon their properties should secure from the National Fire Proofing Company, of Pittsburgh, a copy of its booklet "Natco on the Farm." The work presents numerous illustrations of dwellings, barns and other out-buildings all constructed of hollow tile, with many construction details. Isolated as the farmer usually is from fire protection of any sort his need for firesafe construction is far more imperative than is that of his neighbor in city or town, where such protection is readily available.

Aside from its fire safety feature the hollow tile structure of course is vermin proof, a by no means unimportant consideration with the farmer.

A folder lately issued by the Detroit Steel Products Company, Detroit, Mich., details the operation of an appliance for opening a series of windows by one action.

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Lumber Dealers Start Something

The retail lumber dealers' associations, one after another, at their annual meetings have been adopting the following significant resolution, says "The Clayworker":

"Be it Resolved, That it is the concensus of opinion of this convention that it is to the best interests, not only of the manufacturers, shippers, contractors and builders, but of the consuming public as well that cement and clay products be sold and distributed through the retail dealer only."

This resolution is significant not so much for what it says as for what it stands for. It is a plain indication that the retail lumber dealers of the country are recognizing the necessity for a broader view of their business and in this broader view they find it essential to include cement and clay products as factors and not merely as incidental items.

Also it may be presumed that this tentative asking of manufacturers of cement and clay products to distribute through the retail dealers means that the retail dealer himself intends to become more active in pushing these items. Logically, the retailer must become active in pushing any item which he asks the exclusive distribution of. This activity among the retail dealers should help boost the brick building game and it is up to the clayworking industry to get in touch, keep in touch, and see that their products are aggressively pushed by the lumber dealers as well as by themselves.

Napoleon Grey Marble

In a circular letter to architects the Thompson-Kiel Marble Company, 505 Fifth Avenue, New York City, directs attention to Napoleon Grey Marble "which is meeting such great favor for interior and exterior uses." Among other claims for the product put forward by the distributing company are the following:

"Napoleon Grey Marble has all the qualifications of a high grade marble.

"In Tone—it compares with the imported Botticino, Hauteville, Tavernelle and other marbles of this color.

"In Soundness—It has no equal.

"In Price—It is less expensive than Tennessee, and most grades of Vermont marble.

"For Interior Use—Something new. We invite your inspection of the following list.

"For Exterior Use—Twenty years on the market. We can show you buildings that have been up eight to twenty years.

"Absolutely Frost Resisting—No iron impurities and carves beautifully."

Flue Linings Prevent Fire

Chattanooga's Fire Chief, in Annual Report, said, "Out of 333 fires, 165 were caused by defective flues."

Fire clay flue lining prevents soot gathering in chimney, removes the menace of falling sparks, and preventing the high percentage of fires occurring in wooden buildings. The arraignment of the improperly built flue and the wood shingle roof grows more severe each day.

OPENS ATTRACTIVE QUARTERS IN ST. LOUIS

January saw the St. Louis branch of the H. W. Johns-Manville Company comfortably installed in their new building on the southeast corner of Olive and Eleventh streets. The six-story edifice of modern fireproof construction throughout, is a worthy addition to the retail district of St. Louis.

The new building, with a 55-foot front on Olive Street and 109 feet on Eleventh, has six floors and basement, and is equipped with separate elevators for passenger and freight service. Wherever practicable, Johns-Manville products were used, in the finishing of the building: Mastic floors, asbestos wood partitions and a Johns-Manville asbestos roof.

The New Johns-Manville Building
11th and Olive Sts., St. Louis, Mo.

The show room, 55 x 72 feet, with the entire front and side of glass, is the feature of the new establishment. One hundred and twenty-two running feet of show windows afford an unusual opportunity for the display of the entire Johns-Manville line. To supplement the show cases, five kiosks have been built in the rear of the show room to demonstrate the proper roofings to be used on various surfaces and the correct application of the different materials. This practical demonstration of Johns-Manville roofings has attracted much favorable attention from the many callers.

Back of the show room on the ground floor, is the shipping room and the well-equipped auto service department which has a separate entrance on Eleventh Street.

The manager's office and all selling departments' offices occupy the second floor where is also the men's locker room, equipped with the latest sanitary steel lockers.

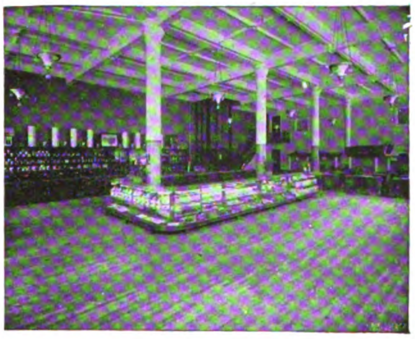
On the third floor is the accounting department, the stenographers and the purchasing and traffic department. A comfortable rest room for women, and the women's lockers are also on this floor.

The fourth floor is taken up by stocks of materials handled by the power plant specialties and electrical departments with enclosed storage rooms for the proper care of stationery, samples and printed matter. Provision is also made, on this floor, for storage of mill board, and a stock of the articles handled by the auto accessories department.

The fifth floor is devoted entirely to pipe covering.

The north end of the top floor, with glass on the whole north and west sides, is given to the gasket manufacturing department. This arrangement gives an abundance of daylight with the least glare, which contributes greatly to the efficiency of the workers.

The balance of this floor is occupied by the construction department and stock room for Keystone hair insulator hair felt and other floor and wall insulations.



A Corner of the Main Floor Show-Room in the New Johns-Manville Building

The basement is used for storing of roofing, asphalt, high temperature cement, asbestos wood, asbestos cement, roof coatings and other roofing accessories in the well-known Johns-Manville line.

All parts of the building are exceptionally light and well ventilated, and the employes can work under the most favorable conditions. It is a fitting housing for the St. Louis branch of the great Johns-Manville organization which "covers the continent."

"Concrete for Beauty, Adaptability and Permanence"

Through the courtesy of The Helm Brick Machine Company, of Cadillac, Mich., we have received a copy of its lately issued booklet captioned as above.

The booklet, of course, strongly recommends the use of concrete construction, and explains at considerable length both through text description and illustrations the merits of the "Helm Dry Wall System," the various character of blocks for which are easily manufactured on Helm presses.

Several pages of the booklet are used in illustrating the widely different character of structures in the erection of which Helm products were used; the buildings ranging from very modest bungalows to substantial municipal and Federal properties, all of which present an attractive appearance.

Good Advice to Supply Dealers

Make sure that your money for building material is well spent, that you have no cause to regret your bargain.

For you can't undo poor construction work except by digging quite a hole into your bank account.

Remember, it isn't what you pay, but what you get for what you pay that makes the bargain.

You'll be pleased, permanently pleased, with everything and anything you get from us—

Cement, lime, brick, roofing, building papers, etc.

And you'll be treated right whether you buy a dollar's worth or a thousand dollars' worth.—"Knickerbocker Komments."

"Don't you think that a Scotch collie has a wonderfully trustful look in its eyes?" said Miss Gush.

"Yes," said Jones, "and I don't see why it hasn't gone into the building and contracting business."

The Average Man's Home

Practical Homes

ARCHITECTS, real-estate dealers, and prospective home-builders will find the above plan books of pronounced help in selecting designs for houses to cost from $3,000 to $5,000 each. The plans were prepared by architects in all parts of the country, with the primary thought of designing houses that are at once attractive, convenient and economical as to cost of construction.

The price of either book is $1.00 per copy. Both can be had for $1.50; or either will be given as a premium to a year's subscription to CONSTRUCTION—the only National Firesafe Building publication in existence. A regular feature of CONSTRUCTION is its Safe Homes' Department, containing illustrations and plans for homes of fire safe types, designed for use of the man of modest means.

To take advantage of the combination offer fill out and mail us the blank printed herewith.

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120 Liberty St., New York City 1918

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LIBERTY BONDS

This space contributed by
THE HOME INSURANCE COMPANY, NEW YORK
ELBRIDGE G. SNOW, President

If you are a Manufacturer of Firesafe Material or Protective Devices,

consistent presentation—in season and out—of your product in CONSTRVCTION cannot fail to result favorably because the success of this publication depends upon

(1) how well it advances and proves the argument for proper fireproofing

and

(2) what it actually accomplishes to increase the use of firesafe materials and devices.

The first objective is attained (intensively) through the editorial, news and advertising sections of CONSTRVCTION and (extensively) by sending the magazine over the entire country to all the business and professional interests related to building, planning, construction, equipment and maintenance.

The second purpose is accomplished by **actively fighting for legislation favoring firesafe construction** and against laws permitting the continued use of wood—and remember that no company can do this work as effectively as a publication, that the "fireproofing fraternity" at present is a composite unorganized body comprising a number of separate units representing more than a dozen industries, that there is practical need of a national mouthpiece such as you have in CONSTRVCTION, that **makers of fireproof materials are now getting but one per cent. of the business which ought to be theirs,** that advertising in CONSTRVCTION is helping yourself to get more orders, giving your goods the representation they deserve—and according this publication the cooperation it merits.

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Why Compromise With The Window Problem?

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COMPANY, INC.
30 EAST 42ND STREET NEW YORK

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Do you sometimes wonder at night whether the man you have trusted with the safeguarding of your business property is attending to his duties? There will be no need to doubt if he carries a

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SHINGLES

APPROVED BY THE NATIONAL BOARD OF FIRE UNDERWRITERS
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TESTED by the Underwriters laboratories under their standard tests, Reynolds Shingles have proven themselves worthy of classification as fire preventatives.

Reynolds Shingles have a top surfacing of granulated slate, granite, etc., and they positively will not ignite from flying sparks or brands. Where fire originates inside the building they have a marked blanketing influence.

We call them "Safety First" because they protect from rain or storms, from heat or cold and from the common agencies which spread fire.

Reynolds Shingles are the standard asphalt Shingles and you will make no mistake in insisting on Reynolds Shingles.

If your dealer cannot supply you write the factory.
H. M. Reynolds Shingle Co.
"Originators of the Asphalt Shingle"
GRAND RAPIDS MICHIGAN

CONSTRVCTION

ADVOCATING THE CONSISTENT VSE OF FIREPROOFING MATERIALS & PROTECTIVE DEVICES

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Ralph P. Stoddard, Associate Editor
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Wm. Wallace Ewing, Consulting Eng.
George H. Stewart, Business Manager

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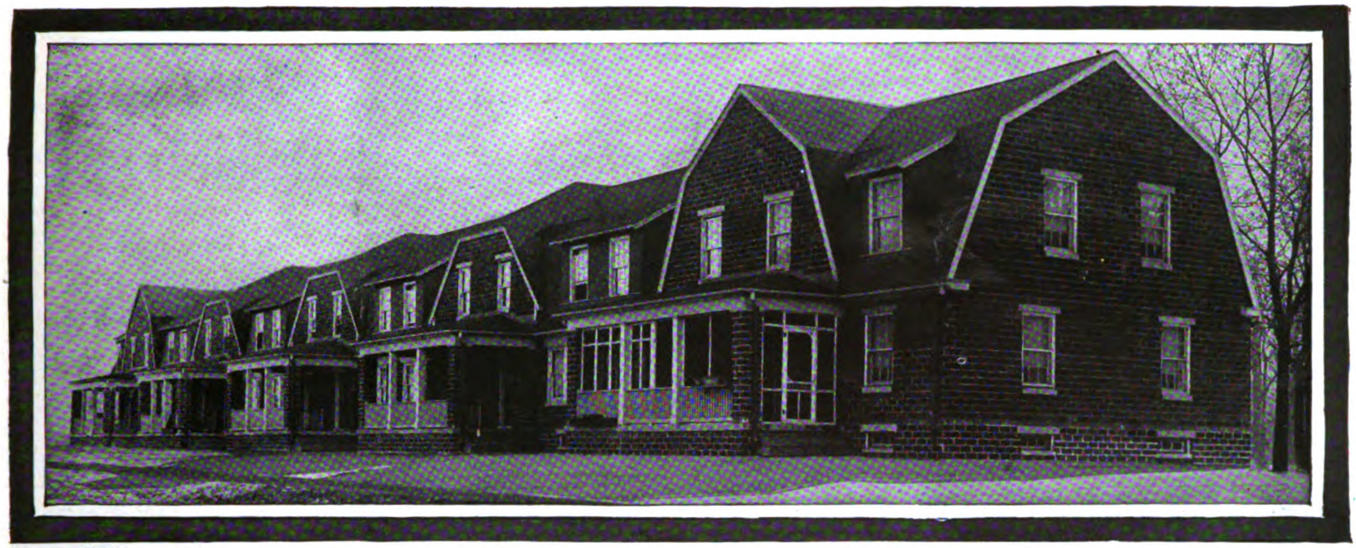

Workingmen's Houses
Bethlehem Steel Co.
Sparrows Point, Maryland

Architects
Bissel & Sinkler
Philadelphia, Pa.

One of four cottage rows, 30' x 250', 10 apartments each, 6 rooms, stair hall and bath.

In this development there are also 30 double houses, each having 6 rooms, stair hall and bath.

Ten rows of shacks, ten 1-room apartments to the row, are also provided as quarters for colored labor.

All these houses are of 8x5x12" Natco Hollow Tile furnished and erected by the National Fire Proofing Company.

Better Industrial Housing

The use of inflammable material in the construction of workingmen's houses is fast becoming an obsolete method.

It has been proven that such homes are only temporary, and, while they last, a source of endless repairs and maintenance expense.

In sharp contrast to the old-style workingmen's villages, consisting of long monotonous rows of tumble-down shacks, are the present-day industrial developments.

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With the use of NATCO these homes are fire-safe and weatherproof.

NATCO needs no painting or repairs.

The big units lay up rapidly in a wall, thus effecting quite a saving in labor.

Our new Booklet on Industrial Housing (Bulletin 172) is just off the press. It contains photographs of several big NATCO developments together with floor-plans of a few houses.

Clip and mail the coupon at once.

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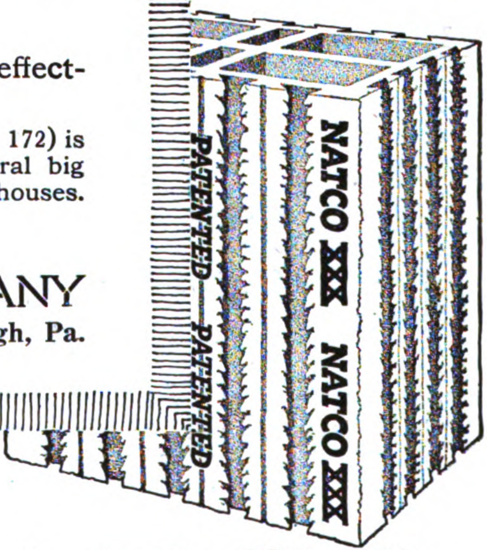
788 Federal Street **Pittsburgh, Pa.**



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788 Federal St., Pittsburgh, Pa.

Please send me your new booklet on Industrial Housing (Bulletin 172).

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is a permanent, everlasting material that is time and weather, as well as fire-resisting.

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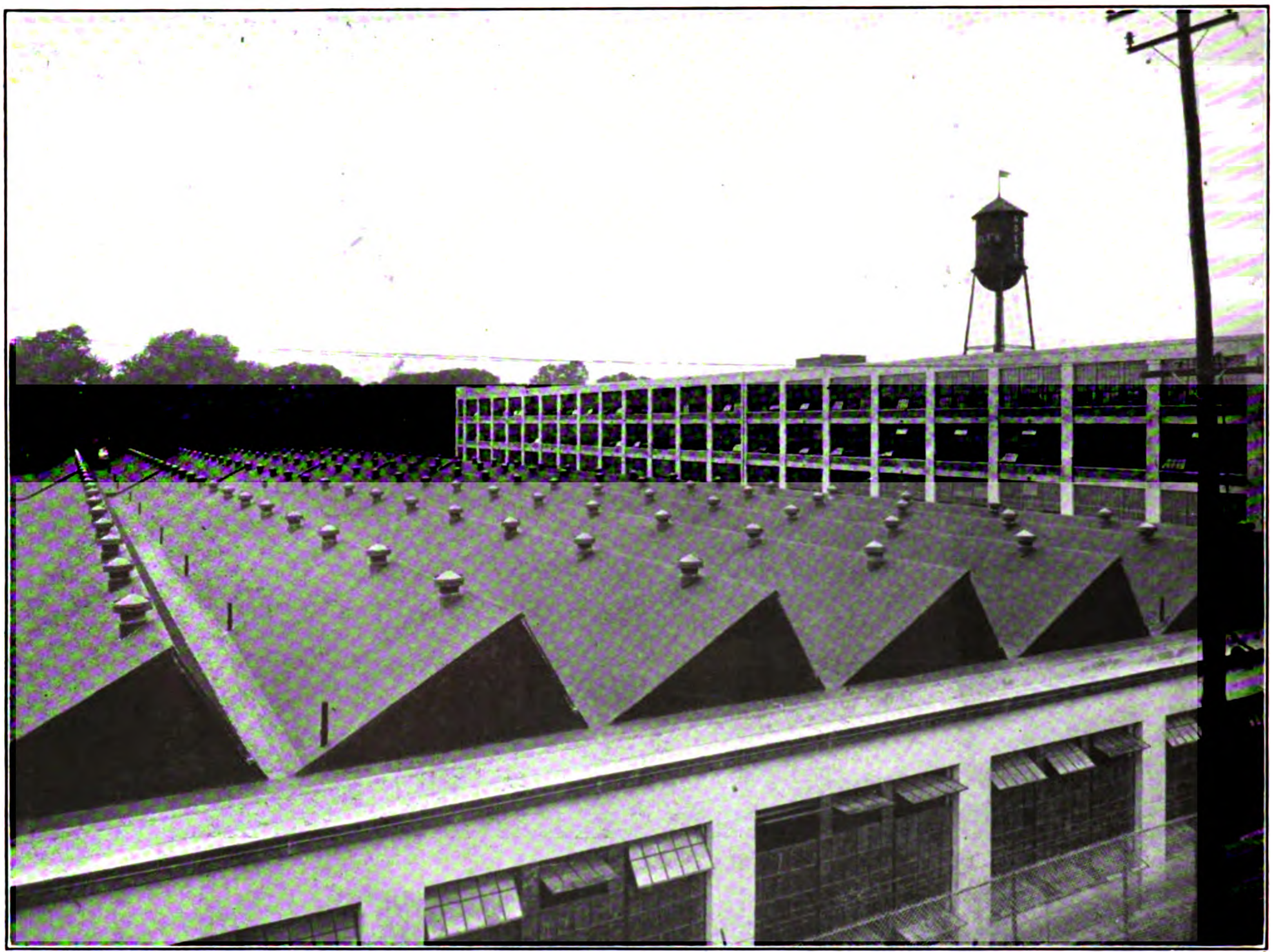

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1/4" thick—Wire Glass

CONSTRVCTION
ADVOCATING THE CONSISTENT VSE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

Vol. VI MARCH, 1918 No. 3

Indianapolis Narrowly Escapes Conflagration

AN abundant supply of water, absence of high winds, and unusually efficient work by the firemen alone saved Indianapolis from a serious conflagration a short time ago, when the Industrial Building, an extensive property burned, entailing a direct loss of fully $1,500,000. The destroyed structure occupied an entire block, "located in a densely built-up residence section, occupied mainly by negroes; the houses being all of frame construction with wood shingle roofs." The combination of wooden frames and roofs afforded an admirable path along which a conflagration could travel, and once started under such conditions the fire undoubtedly would have swept on to the mercantile and the more pretentious residence sections of the city, producing incalculable loss and suffering.

Fortunately the firemen, fully alive to the potential danger kept streams of water playing upon the threatened frame dwellings, which were thus saved from no more serious damage than paint scorchings.

But though the threatened menace to the city was averted, the authorities of Indianapolis should not, and we trust will not, fail to profit by its lessons, and in the revised building code upon which attention is being centered, sweeping prohibition of the continued existence of conflagration breeding frame structures and wooden roof coverings within the municipal limits should be incorporated.

So much for the community lesson which the fire in the Industrial Building clearly sets forth. The warning to private plant owners shown necessary by conditions under which the extensive property was destroyed is none the less plain.

According to the admirable report upon the fire, issued by the Indiana Instruction Bureau of Indianapolis, it was only possible through failure to observe precautions that could and should have been taken.

While to quote the report: Dividing walls * * * were well parapeted, they were pierced by one or more door openings in each floor, partly provided with single metal-clad, tin-clad doors of two-ply cores not automatic and indifferently cared for, some being in very poor condition and usually left open." An excellent system of automatic sprinklers was installed, but the water connection had been shut off at the time it was most needed.

While a watchman was employed he was not required to make rounds at sufficiently frequent intervals (or at least he did not); nor was he compelled to pull boxes, nor was he properly posted as to his duties in the event of fire.

Here then is shown the unwisdom of partial protection; or of imagining that protective equipment does not require constant and intelligent care if it is expected to function properly. Had standard steel clad automatic doors instead of make-shift tin affairs been used; a reliable system of watchman's clocks installed and a constant flow of water for the sprinkler system been assured at all times, the great Industrial Building of Indianapolis, instead of being but a stark ruin today would, in all probability continue to house a great number of active industrial workers.

Fire Walls in Factories

A BILL introduced in Albany, N. Y., proposes to amend Section 79-a of the Labor Law in relation to the construction of factory buildings hereafter erected by adding a new clause to subdivision 2, Section 79-a, providing as follows:

In every building more than six stories in height and more than five thousand square feet in area there shall be at least one dividing fire wall conforming to the requirements hereinafter described and providing horizontal exits conforming to the requirements hereinafter described.

Under existing law, fire walls must be constructed of brick, concrete, terra-cotta blocks or reinforced concrete, and have at each floor level one or more openings, each protected by fire doors which close automatically on each side of the wall.

Elevator Building Code of Pittsburgh

PUBLICATION in a recent issue of CONSTRUCTION of a synopsis of some of the more important regulations adopted by the Elevator Manufacturers' Association, for the installation of elevators in buildings, induced the mailing to this office of a copy of the Pittsburgh code, governing the same matter.

Comparison of the two codes shows much in common, which might be expected. The Pittsburgh regulations, however, deal only with the character of the cars and their appurtenances, and make no reference to the type of enclosures; this latter phase of construction being taken care of in the city's general building regulations.

We were likewise favored with a copy of the Pittsburgh regulations governing the erection and maintenance of motion picture exchanges; a form of hazard deemed sufficiently serious by the authorities to call for a special set of ordinances. The erection of frame buildings as motion picture exchanges is prohibited; all such structures must be built of fire retardant material; their height, too, is limited. Once erected all exchanges must be equipped with automatic sprinklers and other fire extinguishing devices.

A critical reading of both the codes above referred to attests their preparation by men who have made an intelligent study of fire hazards and the means employed for overcoming them.

Housing Women War Workers

AFTER an exhaustive investigation of the subject the Housing Committee of the War Work Council of the Young Women's Christian Association has made definite suggestions to the Secretary of War, and to the chairman of the Housing Committee of the Council of National Defense, for housing women war workers in the United States.

The buildings proposed are of attractive design, both as to interior and exterior, but apparently the construction material is frame, which is regrettable, for despite the use of exterior fire escapes and interior fire walls, the wooden frame always supplies a dangerous fire hazard, which could be avoided if masonry were the building material principally employed.

Letting Their Light Shine

THE Boards of Trade and kindred organizations throughout the country that have most successfully advanced the prosperity of their respective communities, have invariably preserved wide-awake publicity committees, the members of which did not propose that the advantages, claimed for the city or town in which they were resident, should be "hidden under a bushel."

The example of the associated business men in this respect, might and should be followed by the manufacturers of fire-safe building material, who have now an opportunity for doing broad educational work, such as has never been offered them before. The continued high cost of lumber, and the strong probability that it will still further advance in price, has forced prospective builders to consider masonry forms of construction, and has made them peculiarly receptive to reliable data concerning all sorts of non-combustible building material.

Associated and properly directed publicity work by manufacturers of fire-safe building products just now would yield gratifying returns.

A $10,000,000 Fire Safe Building

THE new structure to be built for the United States Navy Department on the Bush Terminal property in South Brooklyn will, it is said, be the largest business structure in the City of New York. It will be 700 by 1,280 feet and eight stories in height. It will be practically fireproof, and will cost $10,000,000. It will have a floor space of 7,168,000 square feet, or over 165 acres. This building will be used for the storage of naval supplies and for the manufacturing, packing and shipping of goods for United States war vessels.

Survey of Building Conditions

A NATION-WIDE survey of building conditions is to be conducted by builders' exchanges and allied organizations for the Government's council of national defense.

Cleveland may be chosen as headquarters of the movement, although Washington is favored by many.

The object of the movement is the establishment of a war building board, which will be in possession of data of every sort applying to the building industry, available for use of the Government at a moment's notice. The movement was initiated by Col. John R. Wiggins, of Philadelphia, president of the National Association of Builders' Exchanges. He has named a committee, headed by Secretary E. A. Roberts of the Cleveland exchange to make plans for the gathering of the statistics.

The Cleveland builders took the initiative in the matter and had provided themselves with this information ahead of the action of the national body to make the movement a general one throughout the country. Its data, in book form, is to be used as a guide to investigators in other cities.

A reduction of about 5 per cent. in fire insurance rates formerly demanded upon brick mercantile risks in Duluth, Minn., and a three per cent. reduction upon their contents, was recently effective because of material improvements in its fire protection.

Rush Construction of Buildings to Aid Government

SPEED in the production of supplies required by the Government for the successful prosecution of the war is the crying need of the hour, for it is appreciated that the duration of the world conflict in which the United States is now bearing so active and important a part, will be influenced in large degree by the rapidity with which our manufacturers are able to execute the orders for materials entrusted to them.

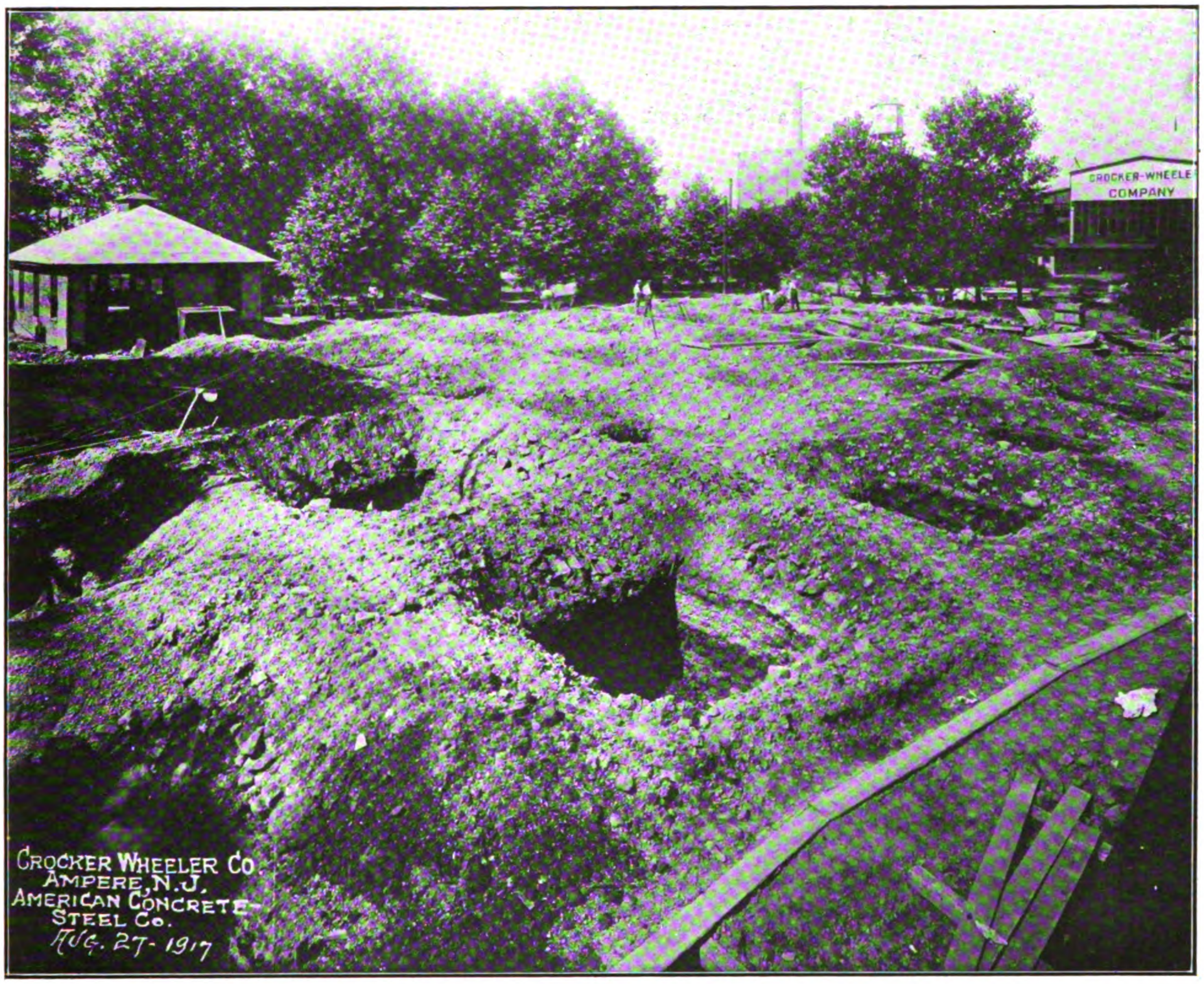


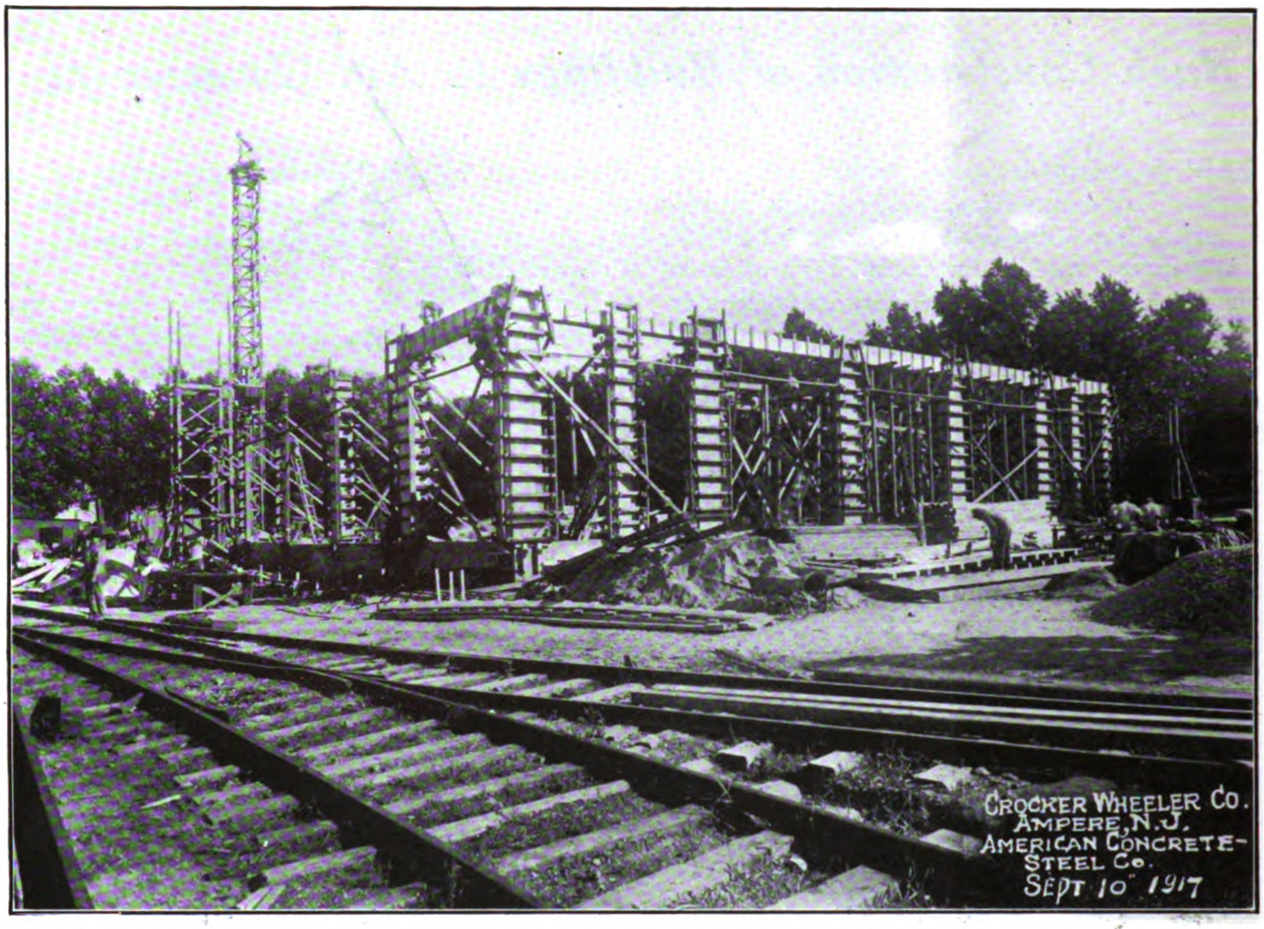
Fig. 1—Beginning Work Upon New Plant for Crocker-Wheeler Company, Ampere, N. J.—American Concrete Steel Company, Newark, N. J., General Contractors

The insistent call for speed upon the manufacturers has been passed by them in turn to the construction companies charged with the erection of new properties or extensive additions to established plants.

Notable among the industrial buildings of recent construction, both for their attractive design and the remarkably short time required for their completion, are the new factory buildings of the Crocker-Wheeler Company at Ampere, N. J.

These buildings, the plans for which were prepared by the engineering department of the Croker-Wheeler Co., are of reinforced concrete construction. All floors are concrete finished, cast monolithic, with the slab. In the construction 15,000 barrels of cement was used, together with vast quantities of other building material.

The larger of the two buildings (No. 70) is 100 by 200 feet and five stories high. The smaller structure is 100 by 150 feet and but one story in height. The



Progress Made in Building the Crocker-Wheeler Company's Plant Two Weeks After Ground Was Broken

work of construction was given to the American Concrete-Steel Co., of Newark—an engineering and contracting corporation of extended experience and large equipment—which not only completed its task very satisfactorily as to workmanship, but saved a full month in the important matter of time, the Crocker-Wheeler people being able to occupy the buildings thirty days in advance of the contract schedule.

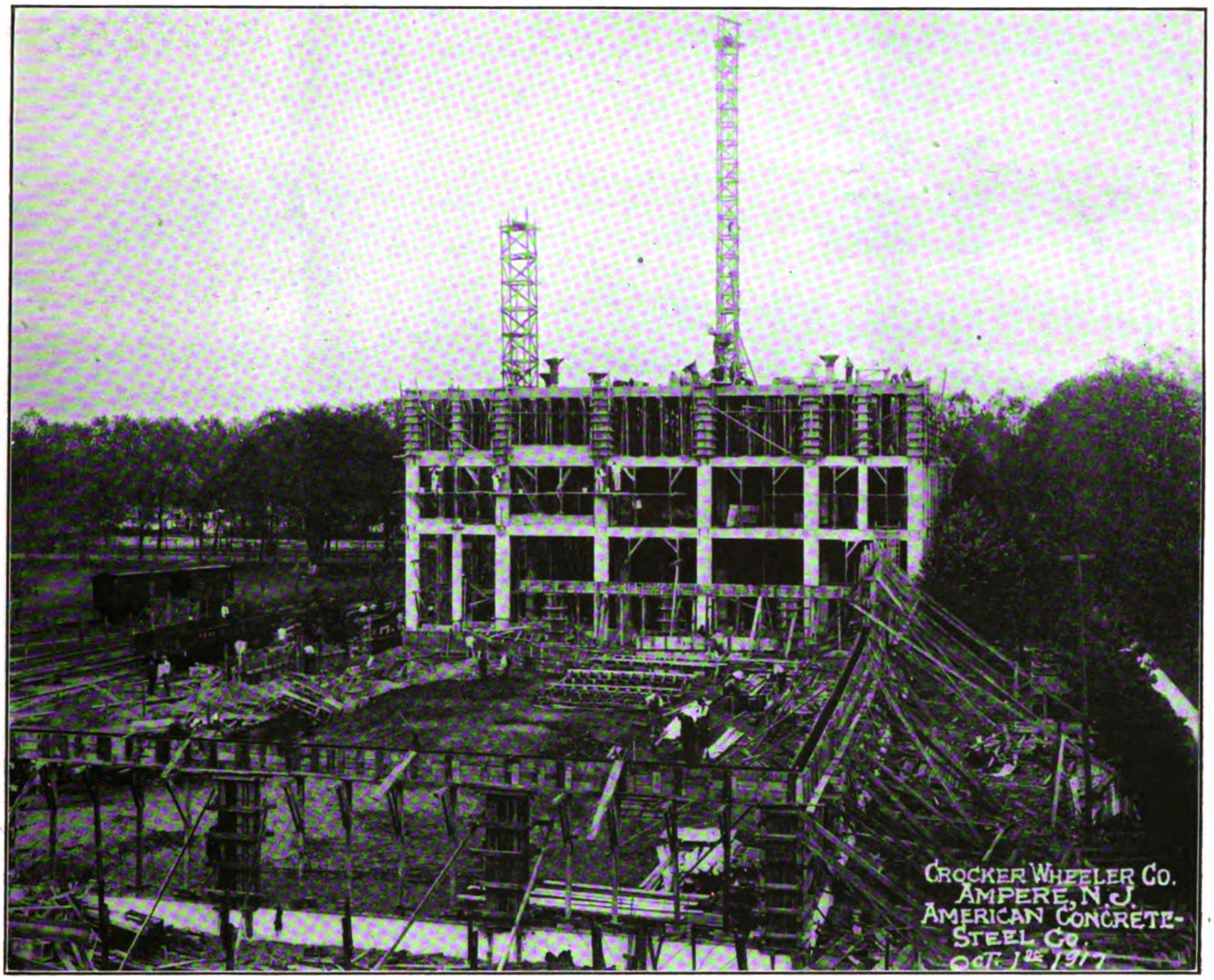
This record, remarkable under the most favorable conditions, becomes especially noteworthy when the then existing difficulties arising from railroad embargoes, car and labor shortages and Government priority calls upon all kinds of materials, are taken into consideration and reflects high credit upon the construction corporation.

The progress of the work is shown in the illustrations upon this and succeeding pages. Ground for the structures, as will be noted in Fig. 1, was broken on Aug. 27, 1918. Within seven weeks thereafter, or on Oct. 22d, the roof of the large building was entirely in place; work upon the smaller structure having made rapid progress at the same time.

Bozeman, Mont., Building Junior High School

FEELING that the amount appropriated for the erection of a Junior High School at Bozeman, Mont.—$130,000—would not permit the construction of a fire-proof structure as commonly understood, the authorities accepted the recommendation of Architect Fred F. Wilson, and decided to meet the fire hazard by "putting up practically a one-story building." Its dimensions will be 175x175, and "it will be divided into three units, separated from each other by brick walls and fire doors; the middle unit consisting of an auditorium with entrance on the ground floor. The stage and property room, which are over the boiler room, will be of reinforced concrete.

"In general the construction of the building will be a combination of brick and frame, with steel trusses, girders and beams, with cast iron columns for supporting most of the ground floor. There will be seven exits to the structure, all widely separated one from another, and insuring the rapid clearing of the building in the event of threatened danger."



Work Upon the Crocker-Wheeler Company's Plant as it Appeared October 1st.

Fire Hazard of Frame Building and Wood Shingle Roofs

ONE of the most interesting of the many notable addresses delivered before the thirty-second annual convention of the National Brick Manufacturers' Association, held at Indianapolis, late last month, was that upon "The Nation's Fire Waste—Its Prevention," by H. C. Brearley of the National Board of Fire Underwriters.

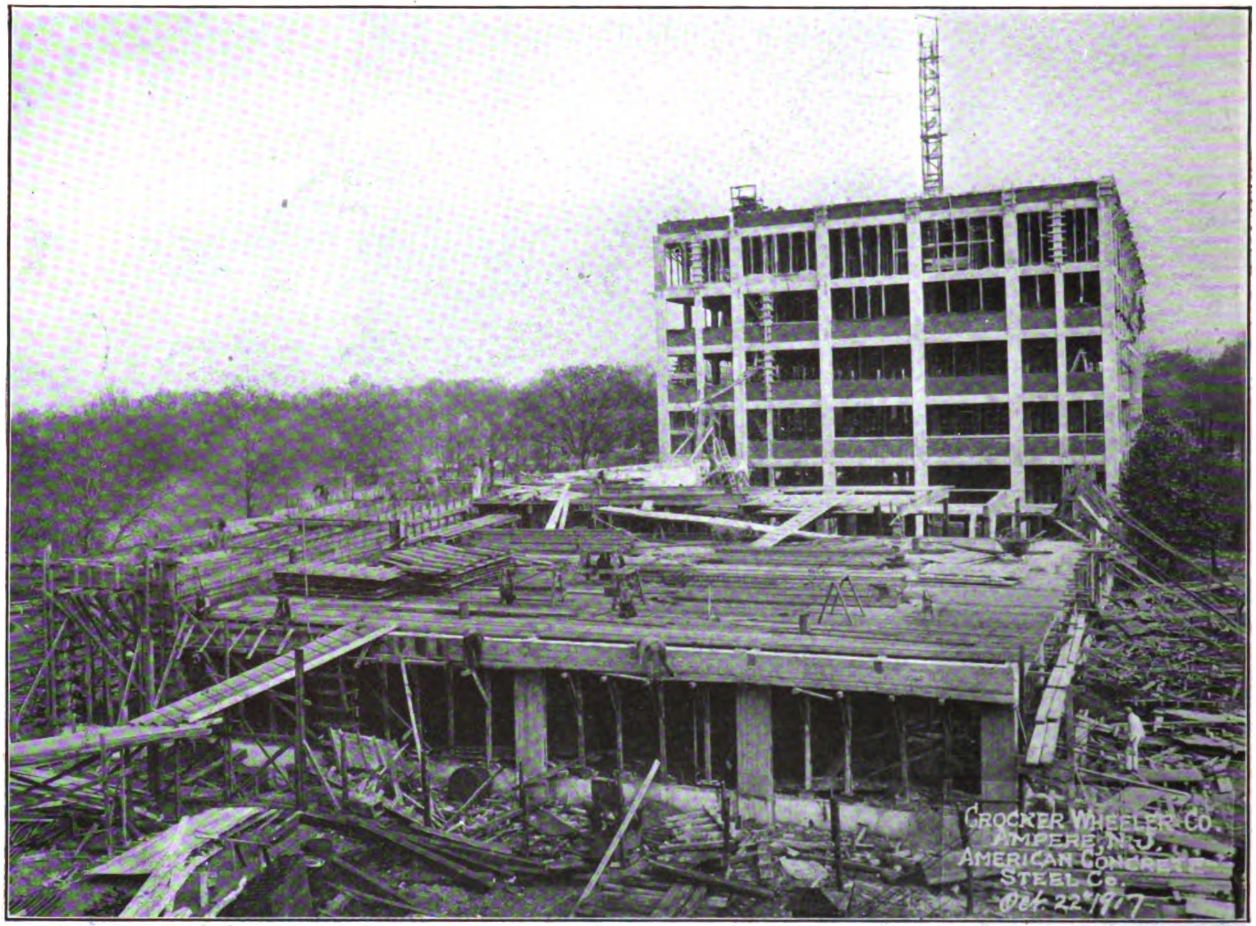
After emphasizing the seriousness of the country's fire waste and the principal causes therefor Mr. Brearley made a plea to the brick men for their advocacy, "not merely for more brick buildings, but for better brick buildings," holding that

"It may be true that a brick, as a brick, will pass through a considerable fire, without being consumed; but it is also true that a well constructed building, largely of wood, may be less liable to destruction than one flimsily constructed of brick. We receive an appalling number of reports of fires in flimsy brick buildings. In the eighty-five fires reported each day from defective chimneys and flues, it must not be overlooked that this extraordinary fire cause, with its millions of dollars of damage each year, is traceable largely to chimneys built of brick. If this nation suffers from conflagrations which could not be conceived in most European cities, it is not simply because Europe builds more largely of masonry, but because it builds solider, better buildings."

Shingle Roofs Should Be Penalized

Discussing various points raised in Mr. Brearley's address, one of the brick men was inclined to place the blame for poor building construction partly upon the shoulders of the fire underwriters. In part he said:

"I think this is a time for constructive criticism. Why is it that the Southeastern Underwriters' Association doesn't have different rates? Touch a man's pocket; that is one way to reach a man. Why don't they prohibit or make it almost impossible for people to have shingle roofs by making the rate high? In the construction of a frame house at this time, there is a flue through the hollow space between the walls—at least this is true of every frame house in the South—



Seven Weeks After Breaking Ground the Roof is Placed Upon the Larger of the Crocker-Wheeler Company's Buildings at Ampere, N. J.

a hollow space leading from floor to ceiling, and in a fire which starts at the bottom of the house, the flames shoot up from floor to floor before you have time to think. Why don't you people refuse to insure a house unless it has a stop at every floor to stop the fire? I think these two things would reduce the fire waste.

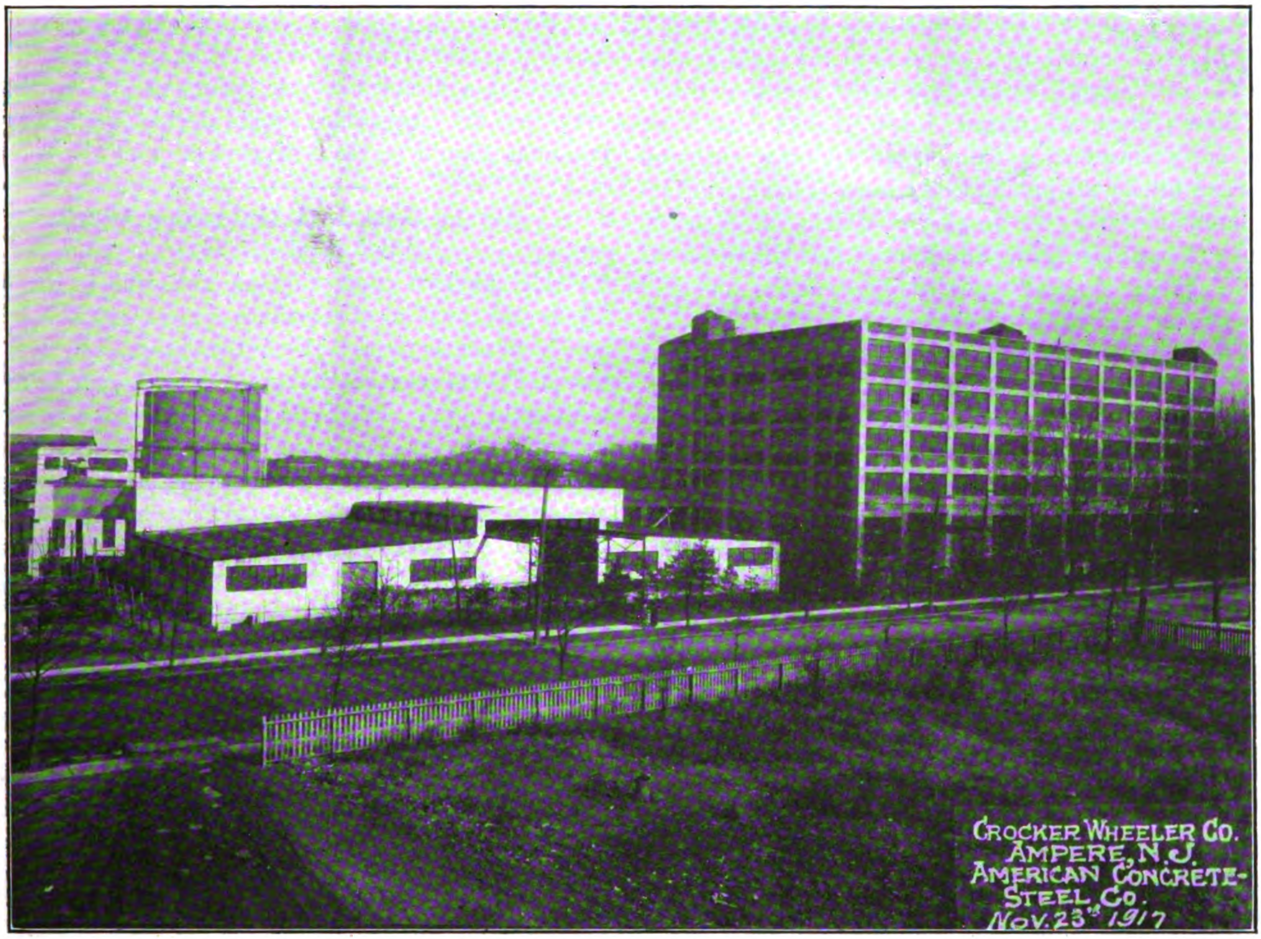
"In that Augusta fire, it would have saved $5,000,000, if we had had fire-proof roofs. The only way possible, in my opinion, is to penalize the city which permits shingle roofs. And if you would refuse to insure houses that have these open flues through the walls, you would stop their building. I do not think we ought to be so selfish in the discussion of this question as to try to enforce brick in every building, because that is not practical, as much as we would like to see it done. But if you would refuse to insure buildings which are extraordinary fire hazards, you would go a long ways to equalize frame and brick, where now there is only a difference of about 12 cents in insurance rates. We would be doing something at the same time to encourage the use of brick in the building of houses. Of course, we do not permit any business houses of frame.

"I am certainly delighted to have been here and heard Mr. Brearley's talk. If this body of men, representing all sections of the country, co-operate with your association in a reasonable, practical and sensible way I believe the fire loss could be reduced very materially in the next few years."

Answering the above for the fire underwriters, Mr. Brearley said:

Viewpoint of the Underwriters

"I am very glad, indeed, to have this question asked. The only way we can get at anything in regard to these matters is by open discussion. The question this gentleman has broached is one with which the National Board of Fire Underwriters has nothing to do—that of making rates. The Southeastern Underwriters' Association and other associations have this function in the different parts of the country where they work. I want to say that you have no idea of the amount of work that has been done, not only by the National Board, but also by the Southeastern Association, in particular, with regard to the evil of shingle roofs. If you knew how persistently that one subject has been talked about, you would realize that underwriters consider it to be the very largest element of conflagration hazards. More conflagration losses occur from shingle roofs than from anything else. The old-fashioned underwriter—and a few survive today—refused



The Completed Structure—The Large and Well Constructed Buildings of the Crocker-Wheeler Company at Ampere, N. J., as They Appeared When the General Contractors Completed Their Work, Over a Month Ahead of Schedule.

to have anything to do with fire prevention. He felt that it was his duty to write risks as he found them, and to charge accordingly.

The underwriter of the new school believes that he has a duty to perform in the prevention of fire, even if it means a reduction in the premium.

"All walls should have fire stops. We have frequently expressed ourselves upon the importance of fire-stopping in walls, and of many other features in fire-resistive construction, but, in the meantime, there are countless buildings containing risks which still must be insured. It is the effort of rate-making organizations to make an exact charge for those risks. This must include a consideration of many things in addition to the condition of the building itself. The question of fire protection in a town, such as the matter of water supply, the condition of the streets, of politics in the fire department, whether the fire department is making a practice of systematic inspections, etc., etc.

"Out of the millions of buildings insured, there are probably many cases in which the rates are not an exact measure of the risk, but we can say, with a great deal of confidence, that there is a purpose to get the rates as nearly exact as possible. It is hard to imagine a more complicated and difficult financial problem than that of fire insurance rates. It sometimes seems as though financing the European war would be a simple proposition compared to making absolutely exact rates, where it is necessary to get together and estimate correctly, all the different elements of fire risks.

"Your expression of a desire to co-operate is most acceptable to the National Board of Fire Underwriters."

Little Chance for Fire in Detroit's Latest School Building

IN preparing plans for the latest public school building authorized at Detroit, Mich., Malcolm and Higgenbotham, the supervising architects, gave close study to the question of fire safety, among the other important features, with the result that the intended structure when completed, will have little to offer as fuel in the event of fire.

The proposed building will be of brick exterior; the floors to be of reinforced concrete and steel, with concrete and Pyrobar roof. All stairways, together with interior columns and beams to be of reinforced concrete. The structure will cost about $250,000, and will be used as a Junior High School.

Dangerous School Buildings Still in New Jersey

WHILE "remarkable progress in the building and renovation" of public schools has been made in New Jersey of recent years, thanks mainly to the enforcement of a modernized building code and a more intelligent public sentiment, it remains unfortunately too true, to quote Dr. Calvin N. Kendall, State Commissioner of Education, "that a number of buildings of obsolete types of construction and still dangerous" are being used.

The comment of the Commissioner regarding the public school building of his State is decidedly interesting and indicates the broad field offered for educational effort by the advocates of fire-safe building construction in otherwise progressive New Jersey.

In part Dr. Kendall said: "There has been great improvement in school buildings in recent years. The investigation by the Senate showed that there were many school buildings housing hundreds of children, unsafe from a fire standpoint, and unhealthy from a sanitary standpoint; that the country districts had been sadly neglected, many of the country schools were in bad shape, some of them being uninhabitable.

To Lessen the Fire Hazard

"After the re-organization of the State Board, a building code was formulated providing uniform standards in construction, requiring for safety from fire fireproofing stairways, corridors and heating apparatus and providing proper exits and fire escapes, requiring complete fireproof schools of certain size, requiring country districts to rebuild or repair the country schools, providing better light, ventilation and sanitation. * * *

"The Building Inspector of the State Board started a campaign to make safer the older and more dangerous schools, with the result that many of the older buildings have had the fire hazard lessened and a large percentage of the country districts have built new and better schools. * * *

"We have made remarkable progress in the building and renovation of buildings. The Building Code has been instrumental in bringing into existence a large number of excellent school houses.

"There are a number of old buildings still used. Many improvements have been added, in an effort to make them safe. They are of old construction, however, and are still dangerous. I have always advocated that all school buildings of more than one story should be of fireproof construction. The present code requires that new buildings of more than two stories in height shall be of fireproof construction.

"There have been several fires in the State, destroying completely the buildings. Fortunately they happened out of school hours and no children were injured. The State is the guardian of the children and it is our duty to provide every means of protection for them. To rebuild the old school houses would entail a tremendous expense on the districts. The menace of a disaster is ever before us. I feel, however, that the Legislature should decide whether these buildings should be reconstructed or not."

Art in Brick and Landscape Work

By B. Mifflin Hood

THE modern conception of landscape in art was unknown to the ancient Greek, as all of the emphasis was laid on the figure. In Byzantine art there was no background, as it was filled in with solid gold. In the early Roman days the real appreciation for landscape began to assert itself, which was expressed in the villas, parks, promenades and gardens and is today typified in the Vatican gardens. The Moors in Spain also appreciated landscape effects as exemplified in the gardens of the Alcazar and the Alhambra. In France, Louis XIV carried out an elaborate landscape effect in the grounds facing the palace at Versailles.

All of the foregoing suggestions belong to the form or geometrical type of landscape, and it is not until you cross to the British Isles that you come to the wilder and more natural type, in which curved walks and roads predominate rather than those laid out on straight lines, examples of which are to be found in the country estates of nobility.

In America there is an ever-growing appreciation of landscape effects. It is in the South that the climatic conditions are so perfect, calling our people into the open and now that the Southern people are beginning to enjoy an economic surplus, we expect wonderful development in landscape treatment. The open terrace on a balmy moonlight night is in keeping with the old Southern colonial architecture, walks of brick laid in herringbone among the box wood, driveways of vitrified brick, garden and terrace walls of texture brick placing in harmony with the Autumn foliage is the Southern ideal.

At Grove Park Inn, Asheville, N. C., we have an example of a broad terrace which required ten carloads of burnt clay products to cover the broad plaza, formerly laid with concrete. This expanse of cold gray color of cement seemed to be the only object out of harmony with the landscape and ideal setting of this famous home-like resort and we were able to convince the management that if this were laid in rubble-random with the broken fragments of our "Pottry" Tile, ranging in colors from reds to flashed browns, bronzes and bluish purples that an effect would be carried out in harmony with nature and produce results far superior to the monotony of cement. The result of this experiment was so pleasing that all the walks, rambling among the hills about Grove Park Inn are being laid with this same material.

Economy in the Design of Reinforced Concrete Buildings*

By CLAYTON W. MAYERS, of the Aberthaw Construction Company

Part II

(Continued from February Issue)

PROBABLY no part of a concrete building is simpler to design than the columns, and because of this simplicity the designer is very likely to give this part of his computations very little special study. It is also true that no part of a concrete building can conceal so effectively the lack of economical design, as can the columns.

Importance of Column Design

The economical design of the columns for a concrete building of only one or even two stories in height, is not a matter requiring much special study, but in buildings several stories in height the subject is one of vast importance. It is not possible to design columns showing maximum economy without careful consideration of several important facts. Engineers designing concrete buildings realize that a richer mix of concrete costs more than a leaner mix. They realize that to offset this extra cost of a richer mix of concrete in column design, there is a corresponding decrease in reinforcement which results in a change in the total costs of the concrete columns. The manipulation of these mixes of concrete in order to determine the most economical column construction is a subject for real study and to accomplish this end the engineer will find it necessary to make several trial designs and calculate the cost of each design. For example, a column 26 inches in diameter, composed of concrete mixed in the proportion of 1:1½:3, reinforced with eleven 1-inch round rods and 1 per cent. spiral hooping, will carry about the same load as a column of the same diameter composed of 1:1:2 concrete, reinforced with seven ⅞-inch round rods and 1 per cent. spiral hooping. As both of these are good designs, the question arises as to which one would be the most economical. Assuming the unit price of 1:1½:3 and 1:1:2 concrete at 36 cents and 43 cents per cubic foot respectively, vertical reinforcement at 5 cents per pound, and spiral hooping at 5½ cents per pound in place, it can be clearly shown that the column composed of 1:1:2 concrete will prove to be the more economical one to use. The point at which the column mixes change and where spirally reinforced columns should be used is determined only by making these comparative estimates.

It is not uncommon to see detailed plans calling for a lap in all the rods in a lower story column without regard to the fact that the column above may call for a lesser number of rods for its reinforcement, and it is only necessary to lap part of them. This is real waste and shows careless design which will run into money faster than the designer suspects. For illustration, the first story wall columns of a concrete building are 36x34 inches, reinforced with twenty 1⅛-inch round rods. The second story wall columns are 36x30 in., reinforced with fourteen 1⅛-in. round rods. A lap of thirty diameters is called for in all column rods. If the entire twenty rods in a first story column are lapped into the second story column it means that six of these twenty 1⅛-inch rods have been unnecessarily lapped and consequently this extra reinforcement wasted. Had only fourteen of these first story column rods been lapped into the second story column instead of twenty, a saving of about 17 lineal feet of 1⅛-inch round steel rod would have been made. This reinforcement, figured at 5 cents per pound, would have shown a saving of about $3 at this one point. Multiply this saving by the number of columns in the building where such laps occur and it becomes no small item. The expense of a case of this kind becomes considerably greater when the column in question is a wall column on which is superimposed a so-called turn up wall beam designed to be cast with the floor slab. In this case the specified lap begins at the top of the wall beam instead of the top of the floor slab and extends upward. For example, suppose a wall beam, extending 14 inches above the second floor, designed to be cast with the slab, had been superimposed on the 36x34-inch wall column just discussed. In this case the lap must be measured from the point where pouring is stopped. If the twenty 1⅛ inch round rods are all carried up into the second story column for a lap of 30 diameters it means that all the rods must extend to a point 4 feet above the second floor, when in reality it is necessary to carry only fourteen of these rods to this point, starting the fourteen 1⅛ inch round rods in the second story column at a point 14 inches above the second floor and extending upward. The loss incurred by carrying the entire twenty 1⅛-inch round rods into the second story column is about 24 ft. of 1⅛-in. round rod, which at 5 cents per pound is about $4, as against the loss of $3 when no wall beam is designed to be cast with the floor slab. Wastes of this nature at the present high price of reinforcement are serious.

Considering Sash and Curtain Wall

In the design of wall columns it will be necessary, usually, to consider the amount of sash and curtain wall required to fill the space between columns, as the smaller the width of the exterior columns the more sash and curtain wall will be required to fill in the space between these columns. This may seem trivial, but it will oftentimes give false impressions of economy if all these seemingly trivial details are not given a place in the estimated comparative costs of the various designs. It may be well to add that no attempt is made to consider any of the various methods of concrete design from an engineering standpoint. This paper is not intended to be a text on design in any form, but rather it is intended to present to the designing engineer a method by which he can solve for himself the question of economy in his work. Hence, the reader should study the examples given here with a view of applying the methods of cost calculation to his work and not draw engineering conclusions from any of these illustrative costs.

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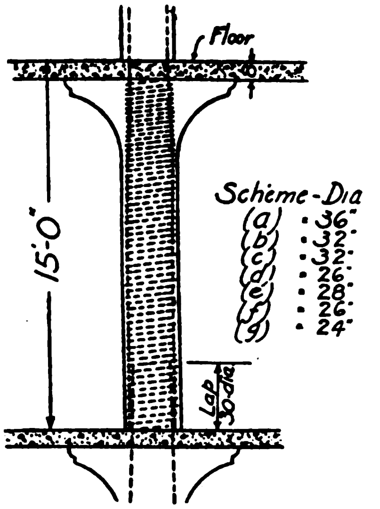
*Prepared for presentation at the Fourteenth Annual Convention of the American Concrete Institute.

Below is illustrated a typical interior concrete column as used in certain types of flat slab construction. Several comparative designs have been made for this column using in each case standardized formulae and fibre stresses. The cost of the various schemes is worked out in detail in the following column.



- Fig. I -

The unit prices fixed to the quantities of material and labor have been taken, principally, from figures in Part I of this paper.

Suggested Officers for N. F. P. A.

FOR consideration at the annual meeting of the National Fire Protection Association to be held at Chicago, on May 7th, 8th and 9th next, the following names have been submitted by the Nominating Committee of the organization: For president; D. Everett Waid, New York City; 1st vice-president; H. O. Lacourt, Boston; 2nd vice-president; W. E. Mallalieu, New York City; secretary-treasurer: Franklin Wentworth, Boston; chairman executive committee, H. L. Phillips, Hartford.

REINFORCED CONCRETE BUILDINGS

Design.	Comparative Estimates.		
Scheme (a):			
36-in. dia. column	Concrete	99 cu. ft. at 34c.	$33.66
11 1⅛-in. rd. vert. rods	Forms	Round steel	15.00
½-in. rd. hoops 12 in. o/c	Reinfct.	716 lb. at 5c.	35.80
Mix 1 : 2 : 4	Lost floor space	5 sq. ft. at $2.75	13.75
	Total		$98.21
Scheme (b):			
32-in. dia. column	Concrete	79 cu. ft. at 34c.	$26.86
23 1⅛-in. rd. vert. rods	Forms	Round steel	15.00
½-in. rd. hoops 12 in. o/c	Reinfct.	1,437 lb. at 5c.	71.85
Mix 1 : 2 : 4	Lost floor space	3⅒ sq. ft. at $2.75	8.53
	Total		$122.24
Scheme (c):			
32-in. dia. column	Concrete	79 cu. ft. at 36½c.	$28.84
12 1⅛-in. rd. vert. rods	Forms	Round steel	15.00
½-in. rd. hoops 12 in. o/c	Reinfct.	770 lb. at 5c.	38.50
Mix 1 : 1½ : 3	Lost floor space	3⅒ sq. ft. at $2.75	8.53
	Total		$90.87
Scheme (d):			
26-in. dia. column	Concrete	52 cu. ft. at 36½c.	$18.98
11 1-in. rd. vert. rods	Forms	Round steel	15.00
1 per cent spirals (18½ lb.) per lin. ft.	Reinfct. (vert.)	514 lb. at 5c.	25.70
	Spirals	264 lb. at 5½c.	14.52
Mix 1 : 1½ : 3	Lost floor space	7/10 sq. ft. at $2.75	1.92
	Total		$76.12
Scheme (e):			
28-in. dia. column	Concrete	60½ cu. ft. at 43c.	$26.02
20 1⅛-in. rd. vert. rods	Forms	Round steel	15.00
½-in. rd. hoops 12 in. o/c	Reinfct.	1,255 lb. at 5c.	62.75
Mix 1 : 1 : 2	Lost floor space	1.45 sq. ft. at $2.75	3.99
	Total		$107.76
Scheme (f):			
26-in. dia. column	Concrete	52 cu. ft. at 43c.	$22.36
7 ⅞-in. rd. vert. rods	Forms	Round steel	15.00
1 per cent spirals (18½ lb.) per lin. ft.	Reinfct.	245 lb. at 5c.	12.25
	Spirals	264 lb. at 5½c.	14.52
Mix 1 : 1 : 2	Lost floor space	7/10 sq. ft. at $2.75	1.92
	Total		$66.05
Scheme (g):			
24-in. dia. column	Concrete	44½ cu. ft. at 43c.	$19.14
10 1⅛-in. rd. vert. rods	Forms	Round steel	15.00
1 per cent spirals (16 lb.) per lin. ft.	Reinfct. (vert.)	606 lb. at 5c.	30.30
	Spirals	229 lb. at 5½c.	12.60
Mix 1 : 1 : 2			
	Total		$77.04

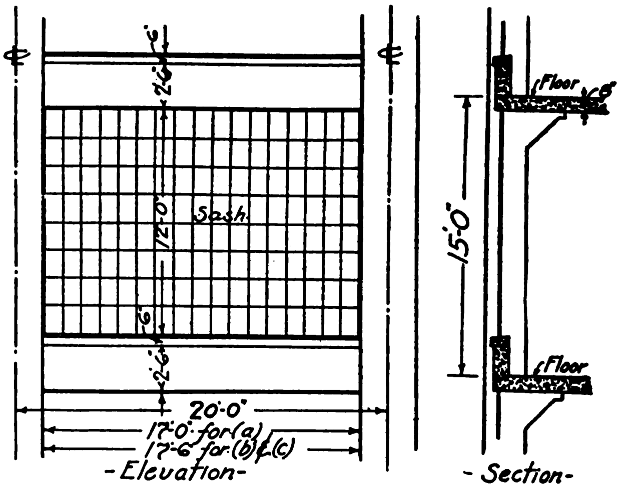
From the foregoing estimated comparative costs, perhaps the most noticeable fact is that the columns using the 1 :2 :4 mix of concrete are among the most expensive. Using this lean mix necessarily produces a column larger in diameter which means, also, a loss of valuable floor space. It will also be noticed that the smallest column designed is not the most economical. The column which shows the most economy in this case is one having a 1 :1 :2 mix and about 1 per cent. of vertical reinforcement together with 1 per cent. of spiral reinforcement. Hence, a rich mix of concrete and comparatively small percentages of steel reinforcement seem to show the most economical results for a column carrying a fairly heavy load.

For comparative purposes, the difference in the amount of concrete in the column heads may be neglected as the top diameter of the head usually remains the same throughout the building. The cost of forming the column and its head has been estimated here at $15 each. This is done for convenience in arriving at a total cost of the column shaft. Ordinarily this cost is neglected in making comparative estimates of interior round columns, as it costs about the same to form a round column of small diameter as it does a column of larger diameter. Many other schemes may be designed for this particular column and the comparative costs estimated. However, the several examples, some of which are obviously too expensive to consider, will suffice to give the reader a working knowledge of the methods of calculation employed to determine the costs of the various types of interior columns. It is readily appreciated that even though a larger column were somewhat cheaper to build, the additional floor space occupied by this larger column might be worth more to the owner of the building than he would save in the construction of the column. Hence, it becomes necessary to consider the value of this additional floor space as a part of the cost of this larger column. It is difficult to say just what this floor space is really worth. However, a satisfactory wal to deal with the situation is to consider the smallest column designed as a basis to which the other columns are to be compared. In the illustration (Fig. 1) this column is 24 inches in diameter. Consider the area of floor space occupied by a column equal to the square of the diameter of the column. The additional area occupied by any one of these larger columns is equal to the difference between the square of the diameter of the column in question and the square of the diameter of the smallest column designed. This additional or lost floor area is priced at a unit cost equal to the approximate unit cost per square foot of floor space of the completed building including heating, lighting, sprinklers, etc. The unit cost per square foot of building is calculated by dividing the approximate total cost of the building by the number of square feet of floor space in the building, measurements to be taken "out to out" of the floor plan. For example, a building 200 feet by 60 feet and five stories high may cost $165,000 complete. This works out at $2.75 per square foot and for general purposes this will give fairly accurate results for the purpose described above.

In the comparative estimates of the interior column (Fig. 1) given, if we strike out of each estimate the cost of lost floor space, the relative cost of each column will remain unchanged. This is not always the case, and even in our examples it will be noticed that the columns having the leaner mixes show up much more favorably when this item of cost is excluded from the total cost of the column. Frequently, the omission of this item will result in a transposition of the economic order of the various designs. In many buildings the loss of a few feet of floor space is immaterial, but in other cases it is of great importance, as in storehouses or in buildings where the machinery layout would be interfered with by a larger column. Where loft buildings or offices are rented by the square foot of net area the cost of this floor space should be figured at a considerably higher figure than the one given in our tables.

In determining the economical wall column, the method is very similar to that used for interior columns except that the item of the cost of wood forms enters into the estimate. It will be necessary also in designing exterior columns to consider the width carefully, as every inch added or deducted will change the corresponding dimension of wall sash a like amount.

On the present page is shown a typical exterior wall column (Fig. 2), for a concrete building having these columns spaced 20 feet apart. Three designs of this column have been compared, and the respective estimates are shown worked out in detail in an effort to determine which one of the three designs would be the most economical to use. Three different mixes of concrete have been used and again, as in the case of the interior column, the column designed to use a 1:1:2 mix concrete appears to be the least expensive to build. Generally speaking, with the present high price of reinforcement, cement is the cheapest reinforcement for a concrete column. Nevertheless, it must not be concluded that a rich mix should always be used in column construction. The proper mix can be determined only by making comparative estimates of several de-



– Fig. 2 –

DESIGN.	COMPARATIVE ESTIMATES.		
Scheme (a): 36 x 24 in. 12 ⅞-in. rd. rods 17 ft. 6 in. ⅜-in. rd. hoops 12 in. o/c Mix 1 : 2 : 4	Concrete	86 cu. ft. at 34c.	$29.24
	Forms	143 sq. ft. at 15c.	21.45
	Reinfct.	777 lb. at 5c.	38.85
	Curtain walls	31 sq. ft. at 75c.	23.25
	Window sill	17 lin. ft. at 60c.	10.20
	Sash and glass	204 sq. ft. at 45c.	91.80
	Total		$214.79
Scheme (b): 30 x 24 in. 10 1⅛-in. rd. rods 17 ft. 10 in. ⅜-in. hoops 12 in. o/c Mix 1 : 1½ : 3	Concrete	71¾ cu. ft. at 36½c.	$26.16
	Forms	129 sq. ft. at 15c.	19.35
	Reinfct.	651 lb. at 5c.	32.55
	Curtain walls	32 sq. ft. at 75c.	24.00
	Window sill	17½ lin. ft. at 60c.	10.50
	Sash and glass	210 sq. ft. at 45c.	94.50
	Total		$207.06
Scheme (c): 30 x 22 in. 12 ⅞-in. rd. rods 17 ft. 2 in. ⅜-in. rd. hoops 12 in. o/c Mix 1 : 1 : 2	Concrete	66 cu. ft. at 43c.	$28.38
	Forms	124 sq. ft. at 15c.	18.60
	Reinfct.	460 lb. at 5c.	23.00
	Curtain wall	32 sq. ft. at 75c.	24.00
	Window sill	17½ lin. ft. at 60c.	10.50
	Sash and glass	210 sq. ft. at 45c.	94.50
	Total		$198.98

signs. For lack of space, only three designs have been considered here, but the principles are clearly illustrated and further designs should be treated in a like manner.

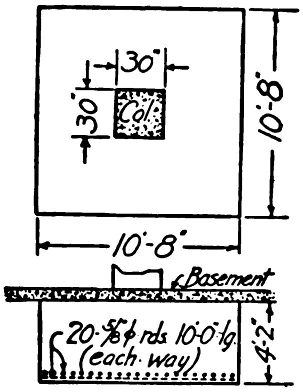
The cost of each wall column design includes the cost of sash and glass together with the curtain wall necessary to fill in one bay. For convenience in making these estimates, it is assumed the glass is factory ribbed glass costing 20 cents per square foot, including glazing. Steel sash is estimated here at 25 cents per square foot, erected and pointed, making a total of 45 cents per square foot for the sash and glass in place. The curtain wall below the sash is figured here at 75 cents per square foot. In making the sketches of the exterior wall bay for estimate purposes, no care has been exercised to select stock sizes of steel wall sash. In actual practice, however, this is usually of prime importance. The cost of the extra floor space occupied by the larger wall column has not been considered here as its influence on these particular columns would be negligible.

Footings

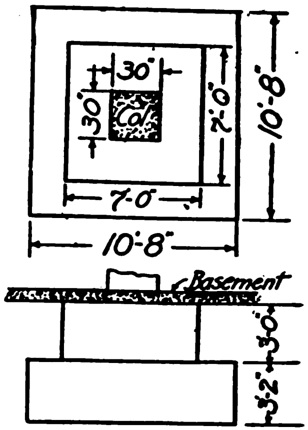
In the design of concrete footings it often happens that it is difficult to decide offhand whether a plain or reinforced concrete footing should be used. A design of each type of footing should be made and the comparative costs calculated. The engineer, knowing the kind of soil these footings will rest upon should price the excavation required at a proper figure. This is a very important part of the footing cost, in fact, many times the most vital part of the estimate for foundation work. In the absence of any more reliable information the unit costs of excavation per cubic yard (not over 5 feet deep) may be assumed as follows:

Loam or other easy excavation	$0.75	cu. yd.
Gravelly earth containing small stones	$1.00-$1.50	" "
Frozen earth	2.25- 2.50	" "
Rock or ledge excavation	3.50- 4.00	" "
Backfill	.30- .50	" "
Sheeting around excavated holes for footings	.10	sq. ft.

For excavation work over 5 feet deep and down to 10 feet deep, the unit cost on the yardage below the 5 foot depth should be increased approximately 50 per cent. The unit price of excavating to a depth exceeding 10 ft. is based on the number of times the excavated material must be rehandled before it is finally deposited where it may be teamed awag or disposed of in some other manner. An example is given here with comparative costs for the two types of footings, reinforced and plain, shown in Fig. 3 and Fig. 4, respectively. The excavation is assumed as costing $1 per cu. yd. to remove, and the excavated holes are sheeted close in order to do away with form work around the large footing block.



-Fig. 3-
(Scheme a)



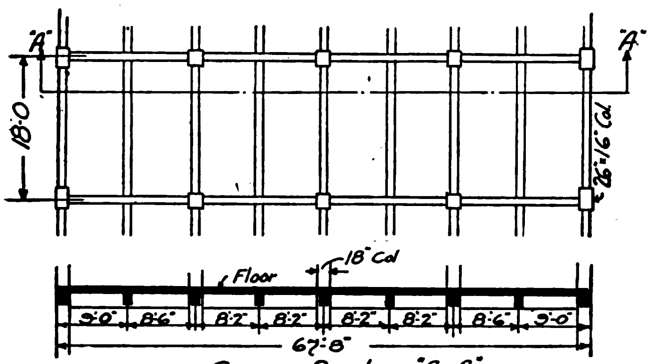
-Fig. 4-
(Scheme b)

Scheme (a), reinforced type (mix 1:2:4):		
Concrete 1:2:4	460 cu. ft. at 34c	$156.40
Forms (none).		
Reinforcement	420 lb. at 5c	21.00
Excavation	19¼ cu. yd. at $1.00	19.25
Backfill and level	19¼ cu. yd. at 30c	5.78
3-in. (close) sheeting	182 sq. at 10c	18.20
Total		$220.63
Scheme (b), plain type (mix 1:2½:5):		
Concrete 1:2½:5	507 cu. ft. at 32c	$162.24
Forms (top block)	84 sq. ft. at 15c	12.60
Excavation	24 cu. yd. at $1.00	24.00
Excavation below 5 ft. mark	5½ cu. yd. at $1.50	8.25
Backfill and level	29½ cu. yd. at 30c	8.85
3-in. (close) sheeting	270 sq. ft. at 10c	27.00
Total		$242.94

The estimates on the preceding page indicate that the reinforced footing is the most economical to use in this case. However, provided stones or "plums" were obtainable at a small expense, the cost of the plain footing could be considerably reduced. It will be noted in the estimates for these two footings that the excavation for the plain footing is the determining factor in its cost. The materials used in the plain footing cost somewhat less than those used in the reinforced type, but the extra depth of the excavation makes the plain type the more expensive one to use. This extra cost becomes still greater when the footings are placed in wet or frozen ground, for which excavation costs are considerably more. In case the reinforced type of footing is built with a sloping top, and a wood form is used for this top, the cost would be about the same as though the concrete were placed up to a level with the top of the footing, and the form work omitted, as above estimated. In some operations the top part of a footing is sloped and the concrete placed "dry." This necessitates a change in the batch, slows up operations and many times does not work out economically. For estimating comparative costs of footings it is not a safe procedure to assume that the top part of the footing will be placed "dry" in order to do away with forms on the slope. Either estimate a form for this sloping surface or figure on the concrete as being placed up to a level with the top of the footing.

Beam and Girder Floors

It has been previously stated that in the design of



- Cross- Section "A-A" -

- Fig 5. -

the beam and girder type floor, the omission or addition of one intermediate beam per bay may influence the cost materially. Although this problem is usually handled economically by engineers designing concrete buildings which have usual floor loadings and column spacings, it sometimes happens that when unusual floor loadings and column spacings are required, it is necessary for the engineer to determine a layout which will show the most economy. In a proposition of this kind it is first necessary to make the design which looks most likely to be the economical one. Then, two more designs should be made, one having one more intermediate beam and the other having one less intermediate beam. Sometimes the girders should be run in other ways and designs made on layouts entirely dissimiliar. Cost comparisons made of these designs will show conclusively which system should be adopted.

For the purpose of illustrating the methods of estimating beam and girder floors with a view to economy, the two schemes shown in Fig 5 and Fig. 6, designed for the same column spacings and live loads, are estimated here in a comparative way. Only these two layouts are compared here, but other layouts should be estimated in a similar manner, bearing in mind that the more beams and girders in the floor the more expensive the form work becomes.

In scaling the quantities for the comparative estimates of these two designs, it will be necessary to include all the concrete forms and steel reinforcement in one 18-ft. bay for the full width of the building, which is about 67 ft. 8 in. In Fig. 5 the quantities will include the slab over one complete bay, 7 intermediate beams, 2 wall beams, and 4 girders. In Fig. 6, the corresponsing quantities will include the slab over one complete bay, 11 intermediate beams, 2 wall beams and 4 girders. Below under the head of "Estimate, Fig. 5" and "Estimate, Fig. 6" will be found these respective quantities to which unit prices have been fixed (a list of which will be found in Part 1), and the total comparative cost of one bay for each scheme estimated.

Estimate, Fig. 5.

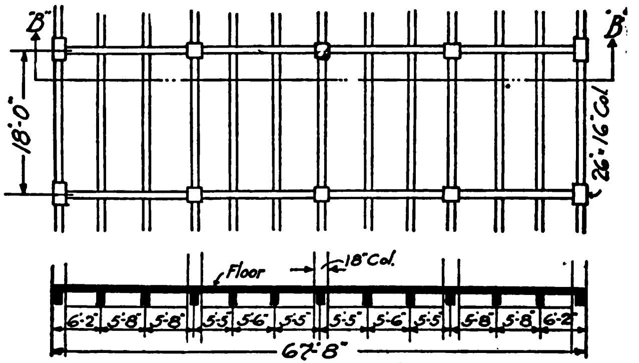
Concrete, 825 cu. ft. at 34c	$280.50
Forms, 1,860 sq. ft. at 13c.	241.80
Renfct., 7,300 lb. at 5c.	365.00
Total	$887.30

(Unit cost, 73 cents sq. ft. of floor.)

Estimate, Fig. 6.

Concrete, 700 cu. ft. at 34c.	$238.00
Forms, 2,000 sq. ft. at 14c.	280.00
Reinfct., 6,300 lb. at 5c.	315.00
Total	$833.00

(Unit cost, 68⅛ cents sq. ft. of floor.)



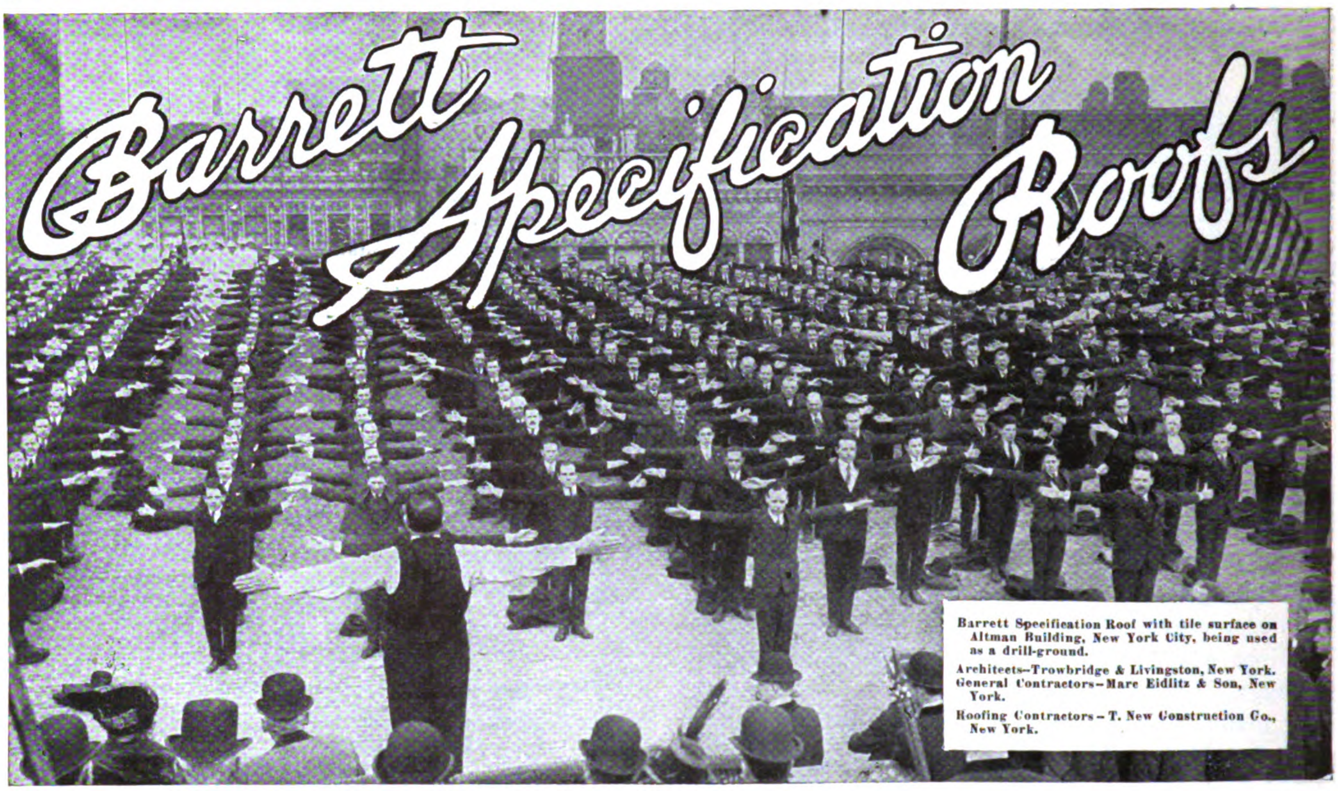
Cross·Section·"B-B"

-Fig. 6.-

In "scaling off" the quantities for comparative estimates of beam and girder type floors, care must be taken to carefully consider the laps in the reinforcement. All steel reinforcement actually occurring in the slab and beams should be estimated. In taking off the quantities, also, it will be found most convenient to first get the quantity of concrete, then the square feet of forms, and lastly the pounds of reinforcement. The order of scaling for the form work and reinforcement should be the same as that followed in getting the quantity of concrete, that is, if beams follow slabs in the concrete scaling, beam steel should follow slab steel in the reinforcement scaling. This method will eliminate to a large extent the liability of error, and also lessen the work of scaling dimensions since the form areas may be taken directly from the scaled dimensions of the concrete work.

The slight changes in column and footing design which might actually occur in two buildings designed with floors like those above estimated, have not been considered here as the details of column and footing costs are treated elsewhere. However, in buildings several stories in height this phase of the design should be carefully considered in conjunction with the cost of floor designs when the cost comparisons are made. Even though the spacing of column remains the same for all schemes considered, the different dead loads may influence the cost of the columns and footings considerably and the different girder depths may make it possible to vary the over-all height of the columns in order to get the same clear head room.

(To be concluded next month)



Barrett Specification Roof with tile surface on Altman Building, New York City, being used as a drill-ground.

Architects—Trowbridge & Livingston, New York.
General Contractors—Marc Eidlitz & Son, New York.

Roofing Contractors—T. New Construction Co., New York.

A Severe Test—A tile-surfaced Barrett Specification Roof being used as a Drill-Ground

Hundreds of marching feet—a regiment in action with a roof for its drill-ground—that's what you see above.

You couldn't use a roof much more severely than this.

And that's what happened almost daily for months on top of the big Altman Department Store in New York City, where several hundred members of the Home Defense League have learned to do their "bit."

Barrett Specification Roofs contain a larger amount of waterproofing and protective materials than any other roof-covering.

That is why they give such wonderful service.

And not only do they give longer service than any other type, but they **cost less per year of service.**

If you want this kind of a roof on your building, the way to make sure of getting it is to insert in your building plans the following:

> **"The roof shall be laid according to The Barrett Specification dated May 1, 1916, and the roofing contractor shall secure for me (or us) the 20-Year Guaranty Bond therein mentioned."**

Only competent roofers can obtain the Bond, and the roof is constructed **under the supervision** of a Barrett inspector, who sees that the Specification is strictly followed.

20-Year Surety Bond

We now offer a 20-Year Surety Bond Guaranty on all Barrett Specification Roofs of fifty squares and over in all towns of 25,000 and over, and in smaller towns where our Inspection Service is available.

Our only requirements are that The Barrett Specification of May 1, 1916, shall be strictly followed, and that the roofing contractor shall be approved by us.

Barrett Specification Waterproofing

The foundation of this huge structure is also kept dry with a great seal consisting of alternate layers of Specification Pitch and Felt. This is the standard type of waterproofing for all important underground construction.

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Barrett Specification Roof

20 Year Guaranty Bond

Know all men by these presents.

A copy of The Barrett 20-Year Specification with full information will be sent free on request. Address nearest office.

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THE BARRETT COMPANY, Limited: Montreal Toronto Winnipeg Vancouver
St. Johns, N. B. Halifax, N. S. Sydney, N. S.

TRADE B MARK

A Department Devoted to the Use of

AUTOMATIC SPRINKLERS

Edited
IRA G. HOAGLAND, Secretary PAUL MASON, Special Representative
National Automatic Sprinkler Association

Importance of Properly Maintaining Fire Protection Equipment

IF THERE is any one thing in the management of his property that is more vital to the building owner than any other, it is its maintenance. Unless a building is properly cared for and maintained, it soon deteriorates, become unattractive, unsanitary, a menace with respect to fire and loses its rental value or income-producing powers.

What is true of the building is equally true—and even more important—of its protective equipment, if it is of sufficient size and importance to have a private fire-protecting system. Whether this equipment consist of chemical extinguishers, standpipe and hose or automatic sprinklers, the necessity for constant care and maintenance, eternal vigilance to assure maximum efficiency at moment of need, is ever-present and vital to the safety of the building and the welfare of its owner.

Lesson of the Past Winter

Business men and manufacturers throughout the country, and particularly in New York and Boston, owners and occupants of buildings of all classes, had ample proof of this fact in the experiences of the winter just closed, when the combination of fuel famine and long-continued cold—much of it zero weather or below—resulted in the freezing of hundreds of sprinkler equipments, with consequent impairment of fire protection and—at least in New York—the development of the most acute conflagration menace that the Metropolis has ever known.

If the history of this recent fire menace should ever be written, the part which automatic fire control devices played in conserving the industrial values of a nation engaged in the manufacture of war supplies will be better understood; and that history should be of absorbing interest to the building owner or occupant, especially in view of his own responsibility for his own safety—his individual share in effective conservation.

If automatic sprinklers are to function properly—to perform the duty for which they are designed, which is effective fire control—they must be properly installed, have adequate water supplies and be properly maintained. Given proper installation and adequate water supplies, satisfactory or unsatisfactory fire control depends on efficient maintenance or the lack of it.

Psychological Obstacle

The principal obstacle to effective sprinkler maintenance is the human element—the man or men responsible for the equipment—and the result—impaired efficiency—therefore may be diagnosed as the manifestation of a psychological ailment.

Winter impairment of automatic fire control, which was particularly in evidence during the winter just closed, through the widespread freezing of sprinkler equipments, was due in very large degree to this psychological influence—a wrong mental attitude, on the part of owners, toward the mechanical agency for their own protection. This attitude—largely the outcome of their regarding sprinklers merely as an agency for reduction of insurance cost—produced a condition of plant inefficiency or disorganization, which was responsible for depletion of coal stocks, with consequent danger of frozen equipments; shutting off the water, to prevent freezing, and other conditions conducive not only to spread of fire, but to its inception as well—in other words, inviting a conflagration.

This attitude, resulting in such impairment, is just another phase of the great American carelessness that is draining the country of its resources through the great American Fire Waste—milking it of its prosperity; sapping the dynamic force of the Nation behind the armies; making it difficult to win the war and otherwise paralyzing the energies of the American people and preventing adequate accomplishment in both peace and war.

Sprinklers Do Not Fail

Automatic sprinkler protection efficiency depends altogether on proper maintenance of equipment, which is assured only by intelligent human control, including constant and unremitting inspection and prompt and systematic repairs; and sometimes, instead of the human control, automatic electro-mechanical supervisory service. Given a properly installed equipment and adequate supply of water, maximum efficiency—satisfactory fire control—is virtually certain if maintenance is as it should be. Automatic sprinklers do not fail.

In commenting on the essentiality of maintenance, the National Fire Protection Association's committee on field practice, which is the highest authority in the land on questions of maintenance of private fire-fighting equipment, says:

"The mere fact that fire hazards may have been safeguarded and fire protection may have been installed originally in full accordance with standard requirements, is no guaranty that these conditions will remain. Proper upkeep is necessary—and frequent reinspection, test and improvements of appliances are required to insure operating efficiency at all times."

Vital Factor Ignored

Remarking the vital necessity of maintenance and a wrong attitude toward automatic sprinkler protection, which is responsible for considerable of the conditions impairing its efficiency, Joseph Kendall Freitag in his work on "Fire Prevention and Fire Protection," says:

"The value of fire-resisting equipment, whatever its nature, is dependent upon effective maintenance and proper working order. Efficient maintenance is particularly vital to the insurance companies who insure property containing such equipment, for the obvious reason that definite rates, probably involving allowances or deductions in premiums, are fixed on the assumption of the effective operation of such equipment. But the insured often seem interested principally in securing insurance rates as low as may be possible, thereafter leaving the equipment to care for itself, without adequate inspection or repair, and often without the supervision or charge of some one familiar with operation. The idea of looking at fire-resisting equipment in the nature of an investment—an investment against fire loss, interruption to business, or against increased insurance premiums—which will return good dividends in the economies and safeguards provided, does not seem to strike many owners in any light comparable to the investment of an equal amount of money in any branch of their active operations. And yet the neglect of such equipment may and often does mean quite as sure a financial loss as carelessness or oversight in regular businesss matters."

Looking for Financial Return

The editor of the "Quarterly," of the National Fire Protection Association, in commenting on the 1917 annual summary of the record of fires in properties equipped with automatic sprinklers, says:

"The recklessness and indifference shown in many sprinklered plants indicate that the automatic sprinkler is still too widely regarded as a device for reducing merely the insurance premium of the individual rather than for reducing the fire waste of America."

Architects See the Danger

Recently, the fire prevention committee of the New York Chapter of the American Institute of Architects appealed to metropolitan property owners to give a proper accounting of their responsibility in maintaining automatic sprinkler equipments. A part of the letter follows:

"Unfortunate is a tendency of property owners, once having installed sprinkler systems and other fire-fighting apparatus, to consider their duty done and leave everything else up to the Fire Department and the insurance companies. This letter is an appeal to all such to realize that they alone are responsible and responsible all the time, to see that such apparatus is kept in condition for immediate and effective use to save their own property and indirectly that of their neighbors.

"We desire, therefore, as publicly as possible, to reiterate the fact and to urge the necessity of every precaution by every person that another disaster be not added to our present trouble."

Wrong Attitude Brings Danger

The wrong attitude toward automatic sprinkler protection is in too large a measure responsible for the impairment of this protection, especially in cold weather. The wrong attitude is due to too large a measure of interest in the investment feature of automatic sprinkler protection—the savings in insurance cost which pay for the equipment in a comparatively short period of time and afterwards actual interest on the investment, which virtually gives the protection something of a gold bond aspect. Of course, this is a practical and reasonable condition of mind, but it has the effect of impairing a proper appreciation of the protection value of the automatic sprinkler equipment, which after all is said and done, is the transcendent feature, for in itself this protection is an insurance which money cannot buy, namely, insurance against interruption to business, the loss from which in fires amounts to more in dollars than the value of property actually consumed.

The extent of the effect of this wrong attitude is disclosed by the statistics of so-called unsatisfactory sprinkler fires compiled by National Fire Protection Association, which show that 35 per cent. of the unsatisfactory cases are due to conditions which can be classified as defects in maintenance. This is not a decreasing quantity, for the record shows that during the year 1916-17, 57.9 per cent. of the cases of unsatisfactory control of fires were due to faults of maintenance, while the proportion for the 20-year period, 1897-1917, is 35.3 per cent.

Two Great Derelictions.

Most of the increase in 1917's proportion of unsatisfactory controls of fire is due to but two conditions: "water shut off sprinklers," and "obstructions to distribution of water from sprinklers."

During the period 1897-1917, 27 per cent. of unsatisfactory sprinkler controls recorded by the National Fire Protection Association were due to water being shut off from sprinklers when fire occurred. Several years ago a special committee of the National Fire Protection Association made an interesting report upon an epidemic of serious fires in sprinklered risks. Fifty per cent. of the fires were due to water being shut off from the sprinklers and in each case the committee reported that otherwise the system undoubtedly would have controlled the fire with small loss.

Hazard of the Closed Valve

This pertinent comment on the closed valve hazard is found in a report from an insurance company on sprinklered risk fires which resulted in heavy losses:

"In spite of our repeated warnings, owners and managers of factory properties still allow valves controlling water supplies to sprinklers to be closed and remain closed and other parts of apparatus to be in such condition that they are not ready for instant use.

"Fires have recently occurred in four large properties with a total loss amounting to over six million dollars, all in sprinklered plants. In all of these there was a failure of fire protective equipment, and in three of them the water pressure was not upon the sprinklers when the fire occurred, due to closed sprinkler valves."

A few well-organized corporations maintain more or less efficient methods of supervision of their expensive fire protection plants, and in doing this avoid faults and defects that are always sure to occur where mechanical appliances are either ignored or neglected. In some cities the sprinkler installing companies maintain efficient inspection services for the benefit of owners of sprinklered properties. This is an especially valuable service, and one which assures proper operating conditions at the critical time. Many owners depend on the periodical inspection made by the insurance companies, and in risks of this class inspectors generally find much to do.

Value of Supervisory Service

One of the best methods of providing against closed valves is the central station supervisory service. This method comprehends the application of electrical signaling devices to various parts of a sprinkler system, and whenever the normal condition of any of them is disturbed the trouble is automatically signaled to the central station. This service also includes a fire alarm feature, a separate connection between the sprinkler system alarm valve, and the central station.

But above all, that which will count the most in bringing about generally a better maintenance of automatic sprinkler equipments is the right attitude toward this protection, for with a proper interest in it, the property owner is going to see that everything is done to keep things in proper condition for the emergency when it arises, just as he does with anything else in which he has an active interest.

The country's hour of need has struck; but, the fire peril is striking at the Nation's vitals, and unless its thrusts are fended off it will drain America of its life-blood, which is its prosperity, its credit, its power to do and to drive in all the walks of commerce and industry. And without these things it cannot do the work now set to its hand, which is to win the war.

Never before has there been greater need of conserving every ounce of the country's resources, and never before has the fire peril been so portentous; never before has there been such a general realization of the great dependence placed on automatic sprinkler protection for minimizing this fire peril, and never so vitally necessary as now has been the proper maintenance of automatic sprinkler systems.

Court House to be Thoroughly Fireproof

ACCORDING to the plans as finally determined upon the new Court House designed for Polk County, Iowa, and to be located at Des Moines, will be of fireproof construction "in every respect."

Stone and reinforced concrete will be the materials mainly used in the building, plans for which were prepared by an association of architects composed of the following named firms: Keffer & Jones, Kraetsch & Kraetsch, Sawyer & Watrous and Norman T. Vorse, all of Des Moines, and working under the name of the Associated Architects of Des Moines.

The general contract for the work has been assigned to Arthur H. Neuman & Co., while the heating and plumbing equipment will be installed by the Van Dyck Heating & Plumbing Co., both concerns of the home city.

Standardize Brick Sizes

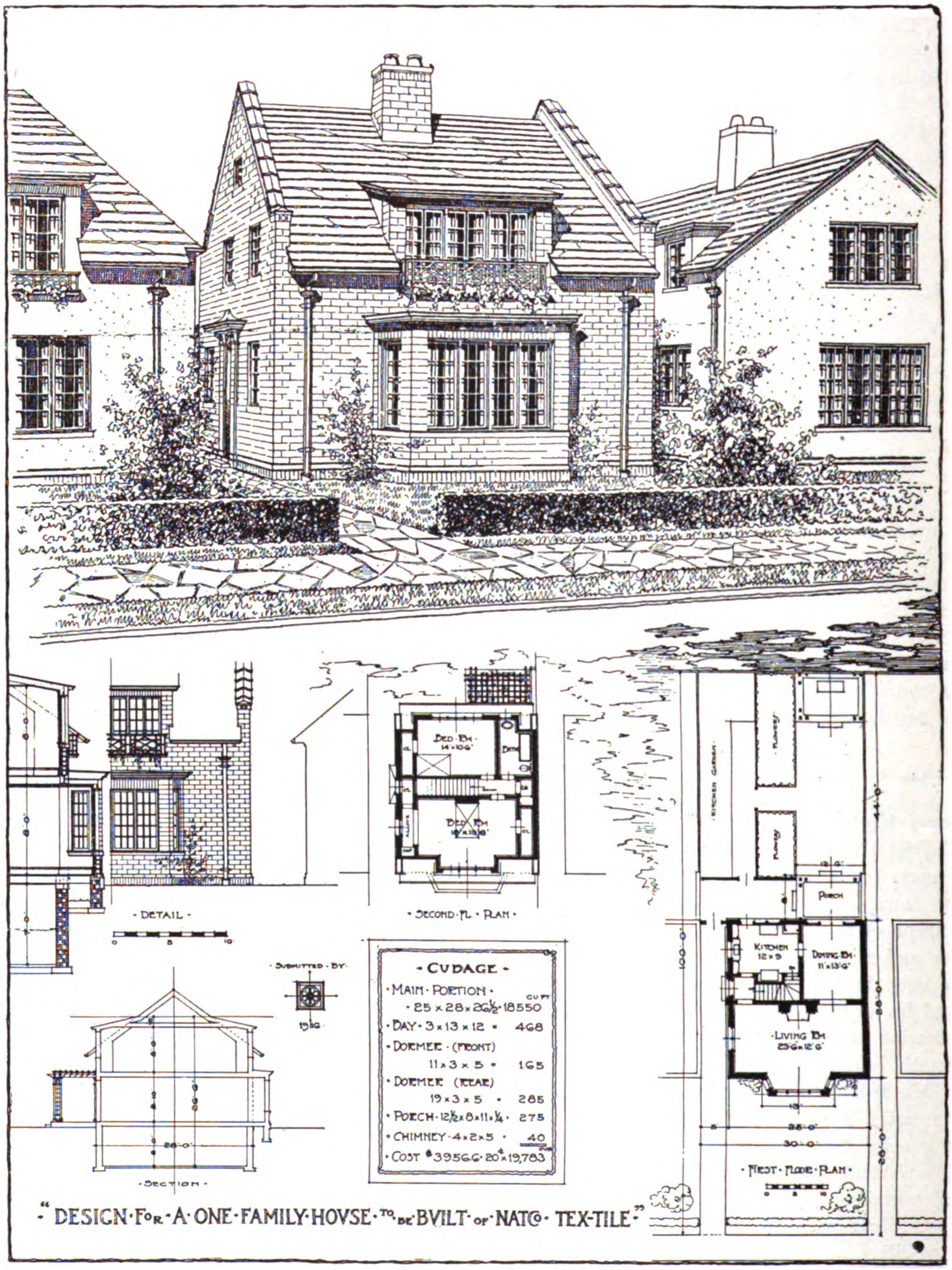
FOLLOWING the example of the American Face Brick Association members of the National Brick Manufacturers' Association at their lately held annual gathering adopted standard sizes for building brick, for average hardness, of hundred:

"Common brick—8"x2¼"x3¾".
"Face brick—8"x2¼"x3¾".

After deciding upon the erection of a new school building to cost approximately $250,000, the Board of Education of Onondago, N. Y., concluded to postpone the matter until a later, though undetermined date. Russell and King, of Syracuse, were the architects selected to prepare the plans and supervise the intended construction.

SAFE HOMES

Edited by **RALPH P. STODDARD, Secretary**
Society Advocating Fire Elimination



"DESIGN FOR A ONE FAMILY HOVSE TO BE BVILT OF NATCO TEX-TILE"

An Attractive Small House

UPON the opposite page is shown a little house which admirably indicates the artistic use of self-facing hollow building tile in home building. This design, which is by Frank Hauska, Cleveland architect, was submitted in a recent house competition conducted by the National Fireproofing Co. of Pittsburgh, to cost $4,000 or under. Its planning is so simple and its design so excellent that little comment is necessary. Its good features all are readily apparent from a study of the drawings. This house may readily be placed on a thirty-five foot lot with allowance for driveway, or on a thirty-foot lot if placed on the building line. Its cost in a city where building materials and labor are not excessive, should not exceed by any considerable amount, the $4,000 figure specified.

Curtail Building—A War Order

THE building industry of the United States is confronted now by the most peculiar situation in its history. It is virtually controlled by Government war order to curtail building—except for war purposes. Since this is of necessity a relatively small part of the aggregate normal volume of the building industry, it constitutes virtually a shutdown order for this branch of business activity for the period of the war.

Explaining its action as a war measure, the Government through the Secretary of the Treasury, has sent out the word that not a dollar is to be expended for unnecessary building—that is building which will not contribute directly to winning the war. That the Government was in earnest is shown by the response from the banks throughout the country. In reporting to the Federal Reserve Board, the regional banks quote their member banks as saying that, except for Government work, there is no building activity in their districts requiring large sums of money.

This, of course, has not brought building to a standstill. There still is a great deal of commercial construction in the form of new war plants and additions to existing plants engaged in war work. Into this latter class falls the bulk of new construction work being done by the Government. Warehouses, special plants for making munitions of various kinds and barracks are springing up in all parts of the country. This construction involves millions and is employing hundreds of thousands of workers. Also, it is consuming millions of tons of materials of all kinds.

But the so-called speculative builder has been effectually eliminated from present activities. And he is the builder of homes for the workers. The percentage of home-owners able to finance a building operation is so small as to be a negligible quantity. They are dependent upon the quantity builder who sells them a home on the small payment plan. Apartments, too, fall into this category, for while they ultimately may be owned and handled as investments, in most cases they are built for sale by their original owners.

Thus has been bred a scarcity of housing that is country-wide and one which presents a serious problem. So serious has it become in some sections that the Government has been forced to take a hand in its solution. It has just obtained of Congress appropriation of money for and authority to engage in the most gigantic housing project in history. The Government's homebuilding activities will, of course, be confined largely to localities adjacent to shipyards or munitions factories, where the demand for housing is more or less temporary and the period of their usefulness limited largely to the length of the war.

The Government thus is aiding in the solution of a problem of its own making. It is admitted that the original appropriation of $50,000,000 is but a beginning of Federal aid in the matter of housing and that it plans, as a part of its war program, to assume responsibility for the housing of war workers.

State Homes

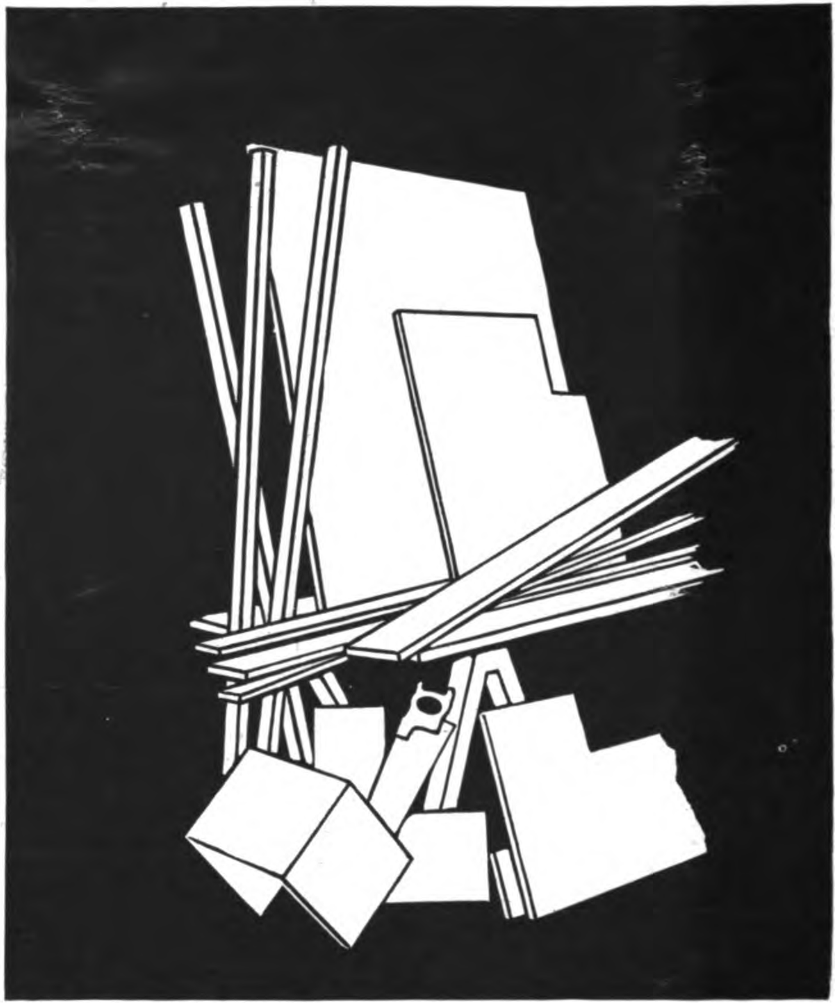
THE State of Massachusetts, realizing that the ownership of a home has in it the essentials of a better citizen, has gone into the business of building and selling workingmen's homes on the installment plan.

The Massachusetts Homestead Commission has been created by the Legislature and is constructing the first unit of homes built under the plan.

Lowell, a large manufacturing center, was chosen as the place of making the experiment. A plot for fifty homes, with ample garden space, was obtained. The homes are nearing completion and soon will be offered for sale. The fact that applications for many more than are building have been received promises success for the project.

The houses are intended for persons receiving $15 a week or less, in order to get them out of crowded tenements and into a home of their own. The original plans called for the sale of the houses for $2,000. Costs of materials and labor, however, have so mounted that it now is found impossible to sell the houses on the small down p yments and minimum monthly installments for less than $2,800 each. The monthly payments are to be $15. On this basis, the State is operating on a 9 per cent. schedule on the money invested. This it hopes to reduce with a return to normal conditions after the war.

That the homes way not fall into unworthy hands, a strict code of conduct for owners has been drafted. It necessitates the houses and grounds being cared for properly and also to make profitable use of the garden plot with which each is provided.



— but any carpenter can work Transite Asbestos Wood

EVEN if metal as a building material did not possess so many disadvantages, its use would always be limited because it is out of the carpenter's field. Metal jobs require special specifications, separate estimates and subcontracts—but any carpenter can work Transite Asbestos Wood.

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Transite Wood will not split or crack. It can be painted and varnished and takes a beautiful polish. Supplied in 1/8 to 2 in. in thickness it can be used as a substitute for wood wherever fire protection is desired. Booklet sent on request.

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CONTAINING DETAILED DESCRIPTIONS OF NEW DEVICES AND APPLICATIONS OF MATERIALS WHICH ARE OF REAL VALUE IN FIRESAFE BUILDING: ALSO NOTES ON THE LATEST BOOKLETS, CATALOGS AND OTHER FIRESAFE LITERATURE, WITH OTHER ITEMS OF INTEREST TO THE FIREPROOFING FRATERNITY

LATEST EDITION

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New York City, N. Y., March, 1918

Priceless

TECHNICAL HAND BOOK ON EXPANDED METAL LATH

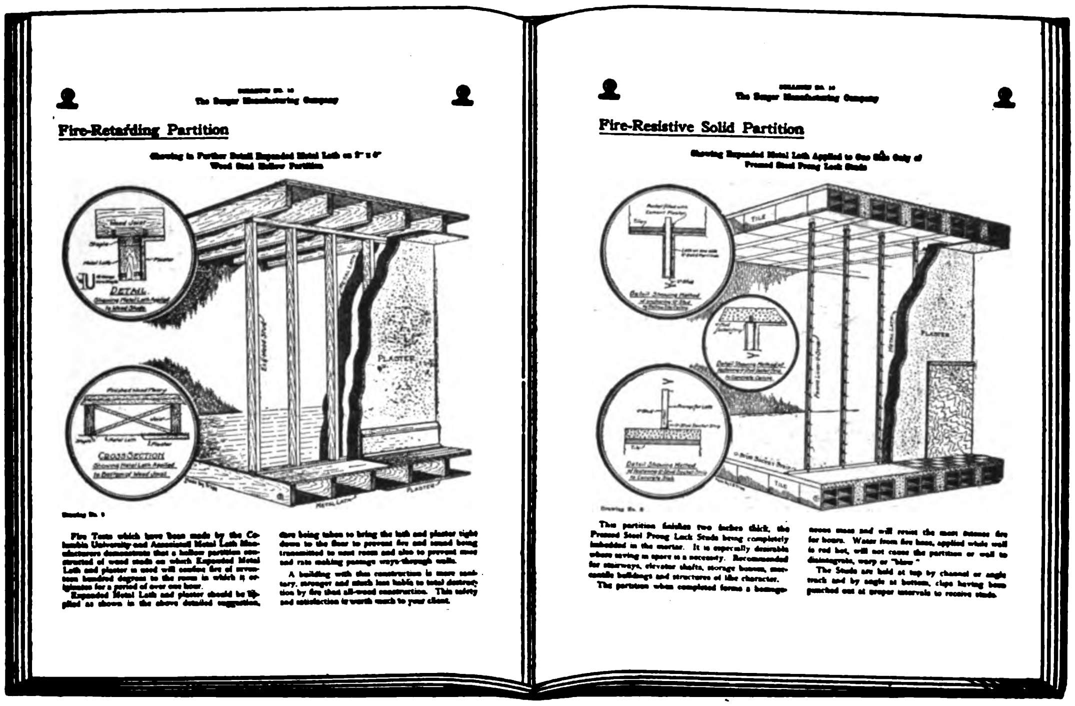
Architects, contractors and others interested in fire-safe building should secure a copy of the "Technical Hand-book on Expanded Metal Lath," newly prepared by the Berger Manufacturing Co., of Canton, O.

Compiled by men of wide experience in the use of metal lath, the material used in the book is authentic and may safely be followed by prospective builders.

By text and illustration the work explains the application of expanded metal lath on wood frame, construction of a fire-retarding partition, the use of "Kornerite," fire-resistive hollow partitions, fire-resistive solid partitions, standard fire-stair wall, standard factory stair inclosures, construction at door jamb, various styles of channel and brick with trim, suspended ceiling, concrete floor construction, round column protection, etc.

The hundred and one uses in which expanded metal lath may be used to advantage is clearly set forth and the method of its application detailed.

The product of the Berger Manufacturing Co. has very extended use throughout the United States and abroad. The circulation of the new handbook will aid in still further popularizing it.



Fire-Retarding Partition

Fire-Resistive Solid Partition

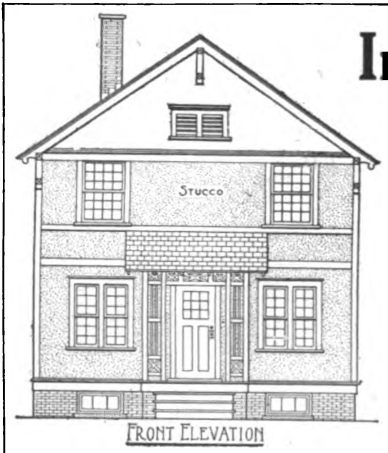
Portland Cement in 1917 Breaks Record

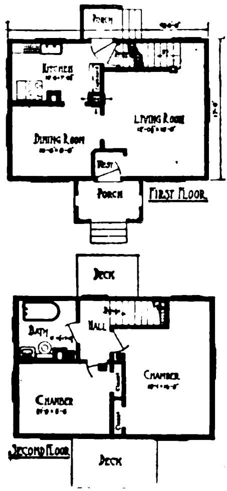
The year 1917 holds the record for production of Portland cement, a total of approximately 93,554,000 barrels having been manufactured, an excess over the former high production of 1913 of nearly 1,500,000 barrels, and over the production of 1916 of more than 2,000,000 barrels, or 2.2 per cent. The shipments in 1917 of approximately 90,630,000 barrels fell below those of the record year, 1916, by nearly 4,000,000 barrels, or about 4 per cent. Stocks at mills increased more than 2,800,000 barrels, or 33.7 per cent., as compared with 1916.

Higher prices for cement prevailed throughout the United States except at a few plants in the Pacific Coast district. Higher prices were, however, accompanied by higher costs of manufacture. Demand for cement was generally very good during the first five to eight months of 1917, but showed a decided falling off during the remainder of the year. Labor and traffic conditions were, for the most part, unsatisfactory.

Masonry Construction on the Farm

Authorities on the subject say that under ordinary conditions each rat upon a farm cost the farmer $1.82 a year. At that cost most farmers ought to see the advisability of building their buildings of brick or hollow tile, which make the buildings proof against this pest.





Industrial Housing

is one of the big problems before the country to-day.

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Berger's Expanded Metal Lath

The plan shown here has been prepared by us as a practical five-room industrial house. A slight extension will make it a six-room house.

If you are interested in an industrial housing proposition as Architect, Contractor or Business Executive, we shall be glad to supply you with full details of this plan together with estimates, additional plans and suggestions. Address Dept. F-19.

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Merger of Sprinkler Companies

A late change of importance in the sprinkler manufacturing field was the merger of three hitherto separate corporations—the Independent Sprinkler Co. of Philadelphia, Aetna Fire Sprinkler Co. of Chicago and the Allis Fire Extinguisher Company of Milwaukee into the Independent Aetna Sprinkler Co. of Philadelphia. The capital of the enlarged corporation is $1,000,000. Western department offices have been established at Chicago.

The officers of the institution are: John M. Duncan, president, and William A. Pope, vice-president.

Valuable Records Preserved Through Fierce Fire

A number of cabinets supplied by the Safe Cabinet Co. of Marietta, O., were in use in various parts of the Ohio Building, at Tulsa, Okla., when the building was destroyed by fire in October last. Starting in the store of a decorating company which had on hand a large stock of paints, oils and varnishes, the heat engendered by the fire was terrific, the building being completely destroyed. Notwithstanding the fiery ordeal to which the safe cabinets in the property were subjected, their contents were preserved intact, fully justifying the claims of the manufacturers as to their fire resistance strength.

J-M Company at Tacoma

Tacoma has "arrived" as a world port—and Johns-Manville Service, the service that "covers the continent," is there.

Tacoma's port business has increased 300 per cent. over 1913—the highest pre-war total—with a higher figure expected because of its natural shipping facilities, its connection with the Far East trade and the C. M. & St. P. railroad's agreement with the Japanese lines. To these commercial advantages have been added six huge shipbuilding plants, turning out both wooden and steel vessels.

For the better service of the shipbuilding and allied interests, as well as the constantly increasing number of manufacturing plants, the H. W. Johns-Manville Co. has opened a new branch office at 1015 A street, Tacoma. Here is carried a complete stock of asbestos packings, moulded and in sheet form and other well-known Johns-Manville power plant specialties. The advantage of a complete stock at hand lies not only in the aid it affords to a proper selection, but in the prompt deliveries which can be made—a point of service greatly appreciated by packing users.

Tacoma industries thus are assured the same service that every other large city enjoys—another example of the Johns-Manville Service, which "covers the continent."

At Cleveland, O., on May 13th and 14th, will be held the ninth annual convention of the National Pipe and Supplies Association. Headquarters will be at the Hollenden Hotel.

The Fireproofing News

An "Adamantile" Floor

A flooring that has the desirable elements of strength, permanence and agreeable foothold and attractive appearance to recommend it is "Adamantile," manufactured by the National Mosaic Tile Co. of Mobile, Ala.

"The tiles are made by molds, which secure absolute perfection of outline and uniformity of size. They are subjected to a hydraulic pressure of 4,500 pounds to the square inch, making them dense and compact, and intensifying their strength. They are seasoned by the application of water and allowed to harden for months undisturbed. This permits the cement to develop itself to the highest possible degree and to an extent not possible to obtain otherwise. There is no heat whatever applied to these tiles and hence the tile is never warped. Medusa white Portland cement composes the entire wearing surface."

"Adamantile" Floor

To Meet Needs of Hoist Users

Manufacturers of monorail electric hoists have formed an organization called the Electric Hoist Manufacturers' Association, of which F. A. Hatch, of the Shepard Electric Crane and Hoist Co. is chairman.

"The association will hold monthly meetings for the purpose of studying the specific needs of the hoist user and to develop standardized methods of presenting information to him so that guesswork will be eliminated," says a statement which has been issued. "The association will consider uniform nomenclature pertaining to types and parts of electric hoists, fix upon a standard by which hoist motors shall be rated and promote the standardization of electric hoists so far as possible. It will also collect and disseminate information and statistics relative to the electric hoist industry, provide facilities and opportunities for study and education in regard to the economics of the industry, extend the use of the product by pointing out the great number of material-handling problems of different classes that can be solved by the use of electric hoists, promote a friendly intercourse and co-operation among the members and disseminate information that long experience has taught is essential to any hoist to insure good results and to recommend to the members of the association well-established principles, both as to the construction and equipment that will tend to eliminate any possibility of inferior product."

Serious consideration is being given by the Government authorities to the fire-safety of cantonments.

No Black Marble From Belgium

A peculiar result of the war is that there will be no imported black marble for many years. The reason is that all this black marble came from Belgium. When the German armies invaded Belgium in 1914 and brought their mammoth Austrian forty-two centimeter guns, they had already mapped the country with the utmost care, and had realized the value of the marble quarry pits for gun emplacements. In the reduction of the fortresses in Belgium and Northern France these quarry pits served their purpose as gun emplacements. But the marble beneath was cracked and shattered by the massive impact and shock of firing the great weapons, and will be useless for building purposes even after the war. Fortunately this country has an abundant supply of black marble of the highest grade and some of this is now on the market.

Building Operations in 1917

Building permits for the year of 1917, showed a decrease of 29%, covering those issued in 102 principal American cities. The list as compiled by the "American Contractor," Chicago, states that 205,667 permits with a total valuation of $648,678,804 were issued during 1917, as compared with 266,049 permits, with a total valuation of $854,920,723 issued during 1916. For the final month of December, 1917, 109 cities reported permits valued at $29,196,350, as compared with $68,043,869 in 1916, a decrease of 57%. Among the more important losses were the following: Boston, 68%; Chicago, 45%; Cleveland, 55%; Cincinnati, 45%; Detroit, 72%; New York, 46%; Minneapolis, 88%; Philadelphia, 86%; Pittsburgh, 57%; San Francisco, 65%, and Washington, 55%. The only large cities reporting gains were: Atlanta, 22%; East Orange, 135%; Erie, 36%; Fort Wayne, 7%; San Antonio, 20%; Schenectady, 87%; Spokane, 420%, and Syracuse, 53%.

Limestone quarries in Lebanon County, Pa., have been purchased by the Lawrence Portland Cement Co.

The Average Man's Home

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The price of either book is $1.00 per copy. Both can be had for $1.50; or either will be given as a premium to a year's subscription to CONSTRUCTION—the only National Firesafe Building publication in existence. A regular feature of CONSTRUCTION is its Safe Homes' Department, containing illustrations and plans for homes of fire safe types, designed for use of the man of modest means.

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and

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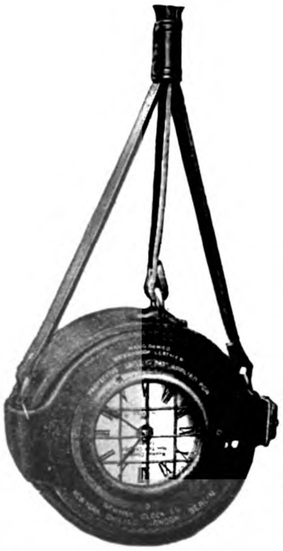

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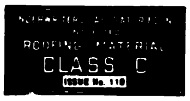

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ADVOCATING THE CONSISTENT VSE OF
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Ralph P. Stoddard, Associate Editor
Bruce E. Loomis, Ins. Eng. Editor
Wm. Wallace Ewing, Consulting Eng.
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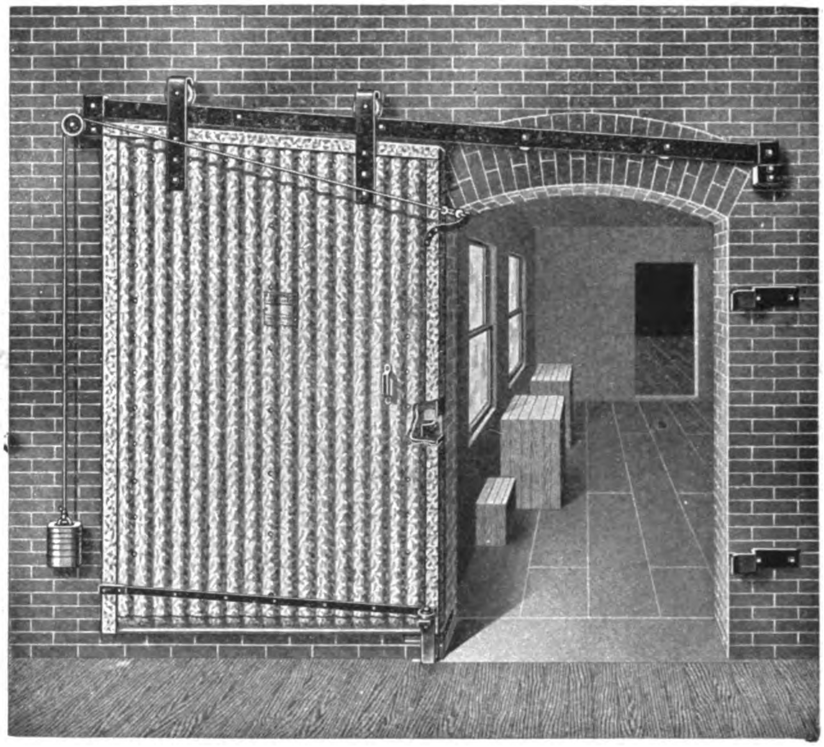

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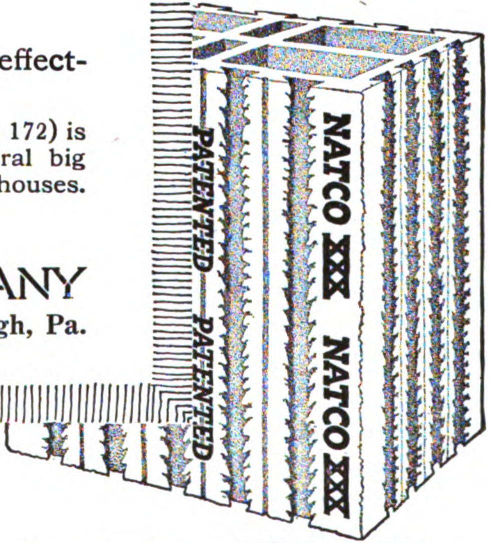

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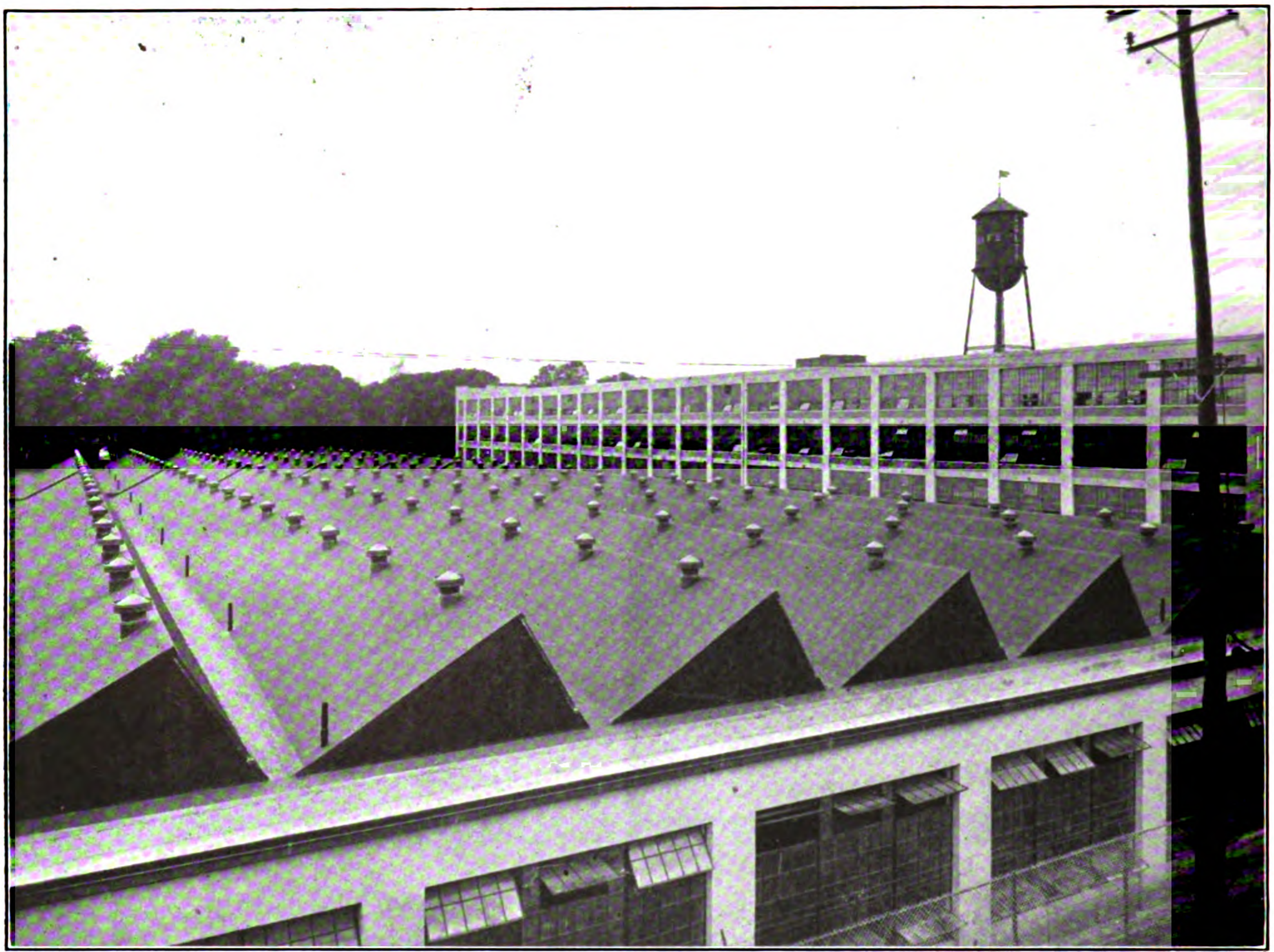

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CONSTRUCTION
ADVOCATING THE CONSISTENT USE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

Vol. VI APRIL, 1918 No. 4

The National Fire Protection Association

Its Beginning, Evolution and Growth

By Capt. Paul Mason

Field Representative, National Automatic Sprinkler Association; Member, N. F. P. A.; Building Officials' Conference; Fire Marshals' Association of North America

THE story of the National Fire Protection Association, which will hold its twenty-second annual convention in Chicago, May 7, 8 and 9, is one of growth by evolution. Originally projected—in 1895— as a working organization of fire insurance engineers, banded together for their own good and the benefit of their companies, the association stands at the threshold of its twenty-third year firmly committed to a definite policy of conserving the lives and economic welfare of the American people by standardization of methods of fire control and co-ordinated direction of the education of the American people in habits of fire carefulness.

Its growth and the broadening of the scope of its activities have been by evolution and not by revolution; and yet there has been something almost revolutionary in the changes of the last five years.

Although the broadening process began at the beginning of the association, when its members, as insurance engineers, were concerned chiefly with standardizing certain kinds of protective equipment, and had little conception of the importance of the educational work to devolve on them, it was not until the eighteenth year that other than insurance interests were given definite and prominent part in the management of its affairs. In the 1913 convention, held in New York, Robert D. Kohn, a well known New York architect, was elected president.

Kohn Awakens Architects

Mr. Kohn signalized his advent in the office by carrying through a speaking tour throughout the country, addressing in most of the leading cities large meetings organized under the auspices of the local or State chapters of the American Institute of Architects. Through this means concrete form was given to the sentiment that had been slowly crystallizing among architects that their profession was vitally concerned with fire control through proper design and construction of buildings, and that an architect must look for success to more than the beauty and stability of the buildings he designed.

To this undertaking is largely due the very clear understanding now existent among the architects, builders and contractors of the country and the makers of and dealers in structural materials, of the importance of structural requirements of design and material in fire control.

Two years later the Association again in a New York meeting, elected Charles E. Meek president, and thus turned the batteries of its influence on the general business interests of the country; for Mr. Meek had long been prominent in and was president of the National Association of Credit Men. Through the local and state credit men's associations he conducted such a campaign as Mr. Kohn had conducted through the architects' chapters.

Organizations of Chapters

An effort was made to popularize the work and literature of the Association, and thus intensify its influence, by the organization of local chapters in some of the larger cities. This plan was not as successful as had been hoped, and was abandoned. The New York Chapter is the only one remaining that holds regular sessions. These are uniformly well attended, interesting and profitable. The night of April 15 it met at the City Club and had a very interesting discussion of "Personal Responsibility for Negligent Fires," in all its phases.

Then the Association membership was recast. Up to the Chicago meeting in 1916, voting power in the organization was exercised only by the associations that constituted the active membership. Associate members could do committee work, and could talk, but they had no real voice on the floor. At that meeting the associate membership was virtually abolished by grant of franchise, which proved a great incentive in arousing and sustaining interest in its work.

Busy in War Conservation

Now the Association, like all other fire control organizations, is actively engaged in war conservation. It is co-operating and collaborating with all constituted agencies for fire control—officials and otherwise—and is creating conservation agencies where none exists. Its educational propaganda, which has been growing steadily through the years, has been speeded up and specialized, and is exercising a broad and broadening influence on fire control throughout the country .

To quote the phraselogy of its own declaration—"The National Fire Protection Association has two functions. One is to make the standards under guidance of which the fire waste may be checked; the other is to educate the people in the observance of those standards and to point out the grievous economic penalties for ignoring them."

Its standards have been made by the representatives of the member associations—the active members. These representatives are expert fire prevention engineers who serve the Association without pay. There is no public effort in the history of the Nation to which has been so freely given, over so long a period, so much of expert thought and painstaking technical investigation as to the National Fire Protection Association.

Making the National Standards

The Association meets annually in a three-days' convention, usually alternating in New York and Chicago; but last year it met in Washington, on invitation of the U. S. Bureau of Standards, with which it works in close accord and co-operation. At these meetings reports on the various standards are presented by its committees of experts and discussed by the convention before adoption. The progress of the Nation in science, invention and the industrial arts makes constant revision of these standards imperative. This is illustrated in the fact that since the organization of the Association in 1895 sprinkler practice has been revolutionized; the electrical code has been made over many times; a vast fabric of safeguards has been made for the manufacture, handling and storage of explosives and volatiles; standards have been established for the construction of various types of buildings, and known and unknown hazards have increased, multiplied and been intensified to such an extent that the Association has developed complete codes for coping with many that were unknown and not even imagined when it was organized.

For more than 20 years it has been compiling and revising these standards, which are now the recognized national guide and authority, and are officially adopted by the National Board of Fire Underwriters and all other organizations interested in fire prevention or protection.

Its Work is Never-ending

This work of compiling and revising standards covering explosives, gases, oils, electric wiring and all fire appliances must continue indefinitely. It is a work for experts and demands the services of those having technical education. The proceedings of the annual conventions are stenographically reported and issued in printed form, so that all members may study the reports and discussions thereon at their leisure.

In conjunction with the Underwriters' Laboratories Inc. (Chicago), the Mutual Laboratories (Boston), and the U. S. Bureau of Standards it has been engaged for some time with exhaustive tests of building materials, for which, in many instances, elaborate machinery has been provided. Results of these tests are promulgated from time to time, through the quarterly or in special bulletins.

In the great work of public education all members can and do share. The colossal fire waste is impoverishing the people; but, they do not realize it. Therefore, they must be taught, through the press, in the schools, and by public speaking; first, that the fire waste adds tremendously to the cost of living, and second, how to stop it.

Provides Fire Control Literature

The association's literature is prepared with the object of educating the layman in fire prevention. Although based on expert knowledge, it is put into popular form, so that anyone is enabled, by its reading, to educate himself in the protection of his own premises and to give sound advice to his neighbor.

The Quarterly Magazine of the Association stands alone in the scope, number and quality of its special articles on fire hazards, fire prevention and protection and the economic effects of fire waste. Its editorial matter is clearly and forcefully written, and its carefully edited department of fire records is indispensable to those who are studying fire causes and effects in specific properties. Special articles described the important fires in the United States and Canada, with special reference to their origin, extent and manner of extinguishment. Statistical records are so kept as to permit the publication of fire statistics on special classes of property or occupancy, showing how most such fires start and how, in the cases cited, they were extinguished.

(Continued on page 121)

Building for Sprague Electric Works

ONE of the finest manufacturing buildings in the State of New Jersey is the recent addition to the plant of the Sprague Electric Works of the General Electric Company. The new building is in Bloomfield, located at the intersection of the D. L. & W., and Erie railroads, and will provide increased capacity for the manufacture of generators, motors and controllers, dynamometers, hoists, ozonators and electric fans.

This additional building was erected by the John W. Ferguson Co., of Paterson, N. J., and is of reinforced concrete, 75 by 550 ft., with an ell 75 by 175 ft., six stories in height, walls and columns being designed for the addition of another story should it be necessary at some future time.

The entire exterior is veneered with selected red brick, using French gray mortar tinted with black. All points are tooled.

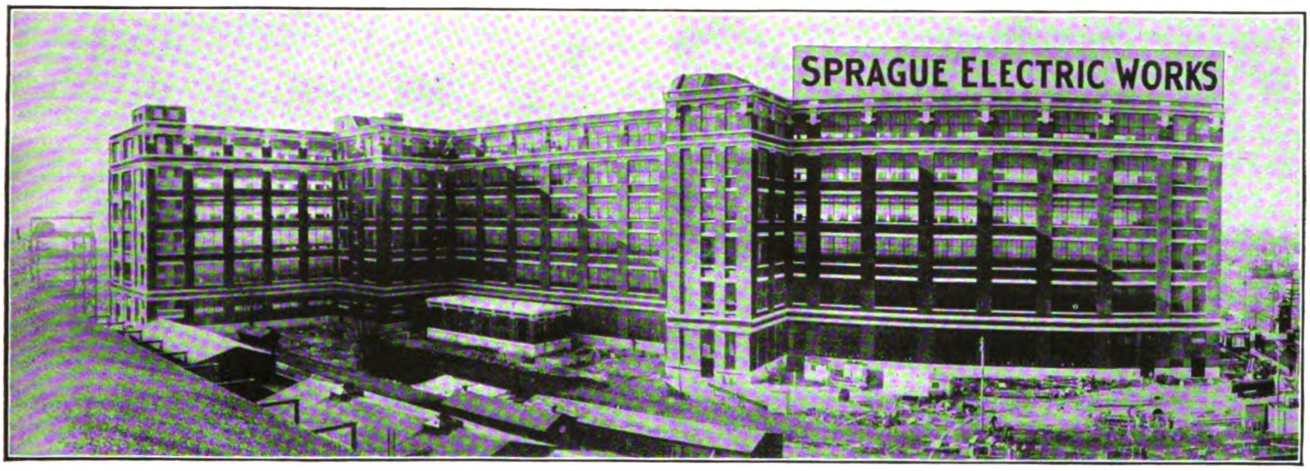
The trimming, consisting of window sills, lintels, belt course, cornice and coping, is of reinforced concrete with rubbed finish.

To provide abundant light for manufacturing purposes and to eliminate dark corners, about 60 per cent. of the wall area is devoted to window space, Lupton counterband steel sash being used throughout the building. In addition, the ceilings are painted with mill white flat finish to reflect the light to the best possible advantage.

The artificial lighting is direct, four lights per bay, except in the office, where the semi-indirect system is used.

There are two exterior and three interior stair towers; all of these are shut off with fireproof walls so that abundant provision is made for escape in case of fire. The stairs themselves are reinforced concrete with railing of wrought iron pipe and wire screen. There are five elevators so situated as to facilitate transportation of material from floor to floor with a minimum amount of trucking.

All floors except the first have a wood finish. This consists of coal tar pitch and sand laid direct on the rough slab, on top of which is placed a hemlock planking under-floor. The under-floor on the second, third, fourth and fifth floors is 3 in., and on the sixth floor 2 in. On top of this was laid selected hard maple finish 1¼ in. thick for the second, third, fourth and fifth floors, and 1 in. thick for the sixth floor. In the hemlock under-floor a series of ducts were formed, both transversely and longitudinally, and through this all electric conduits were run, thus affording easy access and locations. The first floor has a wood block finish.



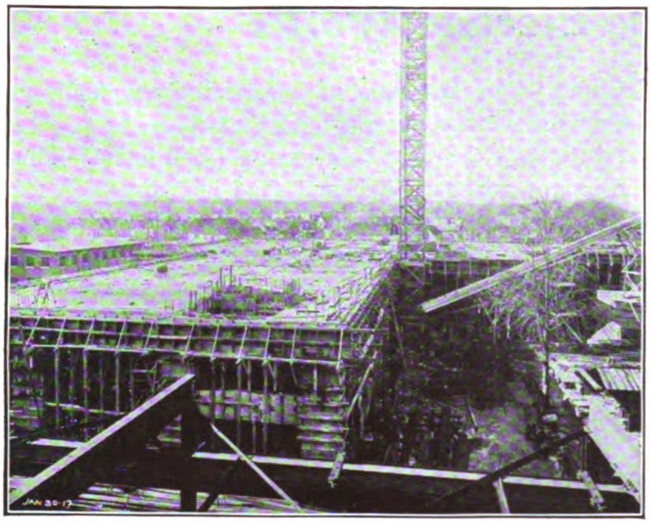
Floors are of reinforced concrete of flat slab type, designed for floor loads of 250 lb. per square foot live load for the second and third floors, and 200 lb. for the fourth, fifth and sixth. The column space is 25 by 25 ft., columns being kept at a minimum size by the use of maximum reinforcement and a rich mixture.

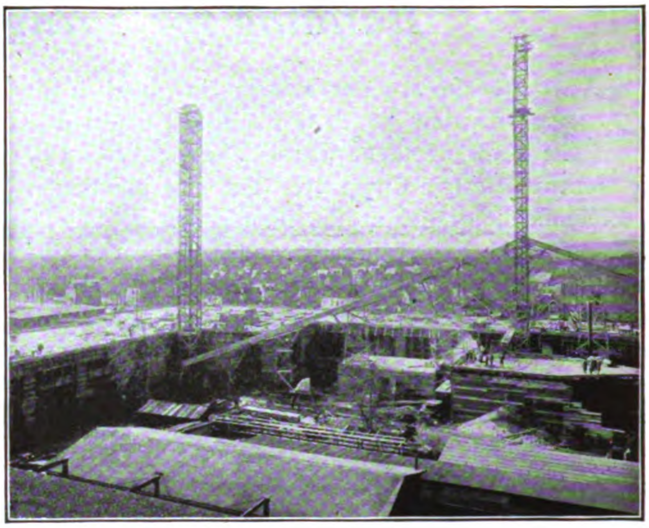
Washrooms and toilets, located on every floor, represent the most modern factory practice.

A steam vacuum heating system is installed and an abundance of coils are placed under the windows so as to take care of the tremendous heat losses from a building having such a large surface of glass.

In spite of the fireproofness of the building, automatic sprinklers were placed on every floor, so that goods in storage or in process of manufacture cannot be destroyed by fire.

On account of congestion on the railroads and the fear of consequent delay in delivery, arrangements were made to bring bulk material to Newark by water, from which point it was taken to the building site by motor trucks. Operations were carried on in





winter weather which necessitated all concrete materials being heated, the chutes from the central tower to the two distributing towers being enclosed in wood with a steam pipe running through, thus insuring heating to the distributing point.

A gravel incline was erected by the Ferguson Company to lead to a point just above the mixers at the foot of the main tower. Here the sand and gravel were dumped through a grated floor into separate bins, thence passing to the mixer while the cement was brought to this point by industrial cars. This made a very efficient and economical way of handling material, and reducing the unit cost to a minimum.

The main building contract was carried out by John W. Ferguson Co., Paterson, N. J. Sub-contracts were as follows:

Contract for electrical wiring; L. K. Comstock & Co.

Contract for sprinkler system; W. G. Cornell & Co.

Contract for heating and ventilating; Baker Smith & Co.

Contract for plumbing; Wells & Newton Co.

The plans of the building were prepared by C. G. Hulth, Superintendent of Grounds and Buildings, General Electric Co., with Harris and Richards, consulting architects.

The plans and specifications for the electric light and power system and equipment as well as for the heating, ventilating and sprinkler system, were prepared by Henry C. Meyer, Jr., and Bassett Jones, engineers, in co-operation with the General Electric Company's engineers.

Concrete Grain Elevators

WHILE denial is made of the charge that the underwriting facilities of the country are insufficient to furnish the full amount of indemnity required upon grain in the Western elevators, it is undeniably true that in specific cases a shortage exists, and the owners of these properties have been compelled to seek insurance in London, and upon the European continent.

Replying to an inquiry upon the subject of grain elevator losses, the Millers Mutual Fire Insurance Association of Illinois, wrote a prominent insurance journal in part as follows:

"The old fashioned wood terminals, large elevators with cty locations have not been written by the mutual companies for several years past, because the loss ratio was very unfavorable on that class. There are not many more such elevators in the country, as we understand it, for many of them have burned and replaced by concrete construction. The concrete fire resistive houses of modern construction and equipment are acceptable risks as far as we know, for all companies and freely written."

Elevator Hazards Pointed Out

In a report on the Dow's Grain Stores explosion and fire (Brooklyn) the New York Board of Fire Underwriters summed up the elevator hazard as follows:

"A grain elevator should have the bins and other portions made entirely of masonry or other approved incombustible material. All bins should be covered at top and ventilated. Elevators having high bins made of ordinary wooden cribbing are highly inflammable and difficult to equip with adequate fire protection for use of private or public fire departments. Automatic sprinklers and a stand pipe system for public fire department use may be fairly effective if they are not deranged by dust explosions. Most wooden elevators are of excessive height and area, and have no fire walls to give the fire department an opportunity to fight a fire from above the bins."

Wood Shingle Manufacturers Hard Pressed

INCENSED at the inroads made into their business by fire resistive roofing material manufacturers, lumbermen supplying wood shingles are making a desperate fight to retain at least a portion of the field in which they once held powerful sway. In an effort to discredit their aggressive competitors the lumbermen have not hesitated to circulate stories of the most absurd character regarding the fire resisting qualities of asbestos, slate, tin and other materials now fast supplanting wooden shingles as roof coverings.

One of the latest moves of the lumbermen was to attribute to Fire Marshal O'Connor of Chicago, the statement that "half of his troubles would be eliminated if houses in the Garden City were roofed with shingle instead of slate."

That any fire chief, particularly the head of so important a city as Chicago, should make a statement so wholly at variance with the truth was unthinkable, but to learn if any possible basis existed that would justify such a report, CONSTRUCTION wrote Marshal O'Connor in the matter. His reply follows:

"Chicago, Ill., April 4, 1918.

"Headquarters Fire Department,

"Editor CONSTRUCTION:

"I am in receipt of your communication of April 2, in reference to statements you claim are being made by certain lumber dealers throughout the country in reference to shingle roofs.

"To my knowledge since I have been fire marshal this question has never been brought to my attention by anyone as to what my opinion would be regarding the matter, and of course, it goes without saying that it is entirely out of the question for me to give out a statement of this kind to anybody, particularly when it is contrary to all laws now laid down by fire departments and public safety institutions.

"Chicago has very strict building laws; also a Fire Prevention Bureau dealing with all fire hazards, and you *may say that the statement attributed to me is entirely untrue.*

(Signed) "THOMAS O'CONNOR,
"Fire Marshal."

Own Home Slate Roofed

To a representative of a slating company who called to see him regarding the statements of the lumbermen Chief O'Connor said: The story is absurd and the best evidence of my appreciation of fire resistive roofing is that my own home is slate covered. Subsequently the marshal wrote as follows:

"Chicago, April 11th, 1918.

"Messrs. Rohrman-Cooper Co., Chicago, Ill.

"My dear Sirs:

"Your Mr. H. F. Rohrman called on me personally this A. M., with reference to a statement attributed to me regarding the preference of wood shingles over slate roofing in building constructions.

"I have denied making this statement to other people at least a dozen times within the past ten days, and I am at a loss to understand how such a statement could have been circulated as coming from me or any of my assistants regarding this question.

"The City of Chicago has very stringent laws along those lines, and the Bureau of Fire Prevention and Public Safety and the Building Department have ordinances covering this question which are rigidly enforced. And, in view of this, I am quite sure there is no argument which could be put forth that could be charged to this department in reference to the use of wood shingles. Therefore, you may publicly deny this statement as ever coming from me or any of my assistants.

"Hoping this is satisfactory, I remain,
"Yours very truly,
"THOS. O'CONNOR, Fire Marshal."

Communications of a like positive nature were addressed to other fire safe roofing supply dealers by Mr. O'Connor, who is greatly exercised over the attempt of the lumber dealers to place him in a thoroughly false light.

Doubtless the lumbermen were seeking to find some means of bolstering up their product to offset unanswerable charges against it as is contained in the following editorial from a leading insurance journal:

Peril of Shingle Roofs

"The peril of shingle roofs was never more obviously demonstrated than when the Central High School building at Jacksonville, Ill., burned. A block away there were four churches, one on each corner of the street intersection. Three of the churches had non-combustible roofs and were not damaged. One had a shingle roof and burned. All the buildings between the school house and this corner had composition or non-combustible roofs and did not catch fire. The church that burned caught fire from sparks on the roof, resulting in almost a total loss."

Verily the dangerous wood shingle has no place in modern building practice, and the sooner its use is abolished by municipal ordinance the sooner will the economic drain upon this country's resources through fire loss be reduced.

Hydrated Lime in Building Construction

IN a recent communication to the editor of CONSTRUCTION H. L. Freitag, engineer of the Hydrated Lime Bureau, said: "The writer was very much interested in reading an article entitled 'How Concrete Can Be Made Waterproof' appearing on page 61 of your February issue.

"At the close of the article the author sets forth the advantages in the way of increased workability resulting from the use of lime in cement mortars, plasters and stuccos. The facts set forth in the article in question about lime making a mixture work easier under the trowel are quite true, and in accordance with recognized good practice, but the writer fears some misunderstanding may arise from the statements that a wall containing lime may be pockmarked and pitted due to small lumps of lime expanding after they have been in the wall even through a winter season.

"There are two kinds of lime now generally used in building construction. One is lump lime, and the other hydrated lime. Lump lime is the same material that was used by our forefathers in building construction for years and years, and this is the kind of lime the author of the article of February had in mind. Hydrated lime is the newer and up-to-date form of using lime for construction purposes.

"Lump lime is manufactured from limestone by burning at high temperatures and driving off the gaseous matter chemically combined in the stone. The product of this burning (quick lime) has a chemical affinity for water, and upon coming in contact with water it will break down to a powder (this is the process ordinarily known as slaking), and expands to about twice its original size. In order to make certain that quick lime thoroughly slakes in the mortar box, it is necessary to allow it to stand for several days, and sometimes weeks. Some contractors have gotten into the habit of slaking lime one day, and using it the next. This is very poor practice and usually results in pitting. If any small particle of lime for want of more time in slaking does not react chemically with water, it does not slake and consequently does not expand. Suppose this small particle is overlooked by the contractor, and in all likelihood it will be, and is used, the moisture in the atmosphere would, in course of time, react chemically with it and cause it to expand, which would leave a small hole visible on the surface of the wall.

"This is the reason that we used to see a mortar box filled with lime paste for weeks, and sometimes months, on building operations before the lime was used. The contractor was taking the necessary precaution to see that every small particle of lime in the mortar box was thoroughly slaked before applying it to the wall.

"Hydrated lime is the result of slaking lump lime. The process of hydrating, however, does not take place at the site of the building operation, but is executed at the manufacturing plant, and the material is delivered on the building site in 50 or 100 pound bags already for use. Hydrated lime is manufactured by most manufacturers to meet the standard specifications of the American Society for Testing Materials, which society is composed of technically trained men, specialists in their individual lines, who set high class standards for manufacturers to produce. If a grade of hydrated lime passes this specification, the possibility of pitting and popping is entirely eliminated.

"After years of investigation of hydrated lime in concrete, the U. S. Bureau of Standards has found that when from 5 to 15 per cent. of hydrated lime, by weight of cement, is added the strength of concrete in air storage is increased approximately 30 per cent., hence a new factor is added in favor of waterproofing with hydrated lime, where as most waterproofing compounds weaken the concrete to which they are added.

"In view of the fact that there is an increase of strength when lime is added, one is safe in substituting 10 per cent. of hydrated lime for cement in waterproofing concrete of gravity section, such as floors, heavy retaining walls, etc., thus watertightening is obtained at no additional cost.

"In comparing different waterproofing methods it is only fair to take into consideration all points in favor of each individual method, and therefore, I wish to enumerate the most important in favor of hydrated lime. Concrete is made more plastic, and therefore, more easily handled and placed, its strength is improved and the surface of the finish concrete is very much superior to that made without hydrated lime.

"In order that your readers may not have an entirely erroneous opinion about lime, I am submitting this article for publication in your valued magazine and hope you will be able to publish it in an early issue."

Valuable Paper Free for the Asking

COPIES of the highly valuable article entitled "Economy in the Design of Reinforced Concrete Buildings" by Clayton T. Mayers, the third and final installment of which appears in the current issue of CONSTRUCTION, has been reprinted in booklet form by the Aberthaw Construction Company, with which Mr. Mayers is associated, and copies may be had without charge by addressing the corporation at 27 School Street, Boston.

A Notable Collection of Concrete Buildings

"TURNER for Concrete" is a slogan that has become very familiar throughout the East in recent years, and the corporation using it—The Turner Construction Company of New York City—is responsible for the erection of a large number of prominent buildings of reinforced concrete design.

These structures are all admirably adapted to the purpose for which they were designed, and in their planning careful attention was paid to the fire safety, as well as to the utilitarian features.

Upon the two succeeding pages we present a view of no less than 150 buildings, all erected by The Turner Construction Company during the five years 1911 to 1915 both inclusive—together with the names of their individual or corporate owners. The aggregation is one that would do credit to any building concern, and the best evidence of the care and thoroughness with which the structures have been erected is the considerable number of repeat orders given the Turner Company.

The buildings shown upon pages 112 and 113 occupy a combined ground area of 12,925,000 square feet, with a roof area of 2,670,000 square feet. The aggregate window area is 1,285,000 square feet, both hollow metal and rolled steel types of frame being used. The concrete walls in all figure 2,480,000 square feet and the tile walls 1,553,000 square feet. Cement finish floors call for 10,645,000 square feet of space, while an additional 2,280,000 have wood finish.

In the work of construction 1,020,000 barrels of cement were used, to reinforce which 77,000,000 pounds of bars were required. Wall and partition work called for 18,600,000 bricks, while other fire-resistive material was used in lesser quantities.

Wired glass, of course, was freely used, increasing the fire safety as well as improving the appearance of the structures thereby. Opening in walls, and corridors are guarded by approved fire doors, while the famous Peelle doors protect the elevator entrances making impossible the passage of flame through such channels.

Of masonry construction and hence highly fire-resistive, the contents of the buildings are protected from fire through the installation of automatic sprinkler systems of latest approved designs.

Sample of Sprinkler Equipment

As a sample of the thoroughness with which the interior fire hazard of many of the buildings is guarded against we give particulars of the automatic sprinkler equipment installed in the Merchants Refigerating Company's plant (number 76 in the group), by the Globe Automatic Sprinkler Company of Philadelphia, one of a number of the properties protected by its service.

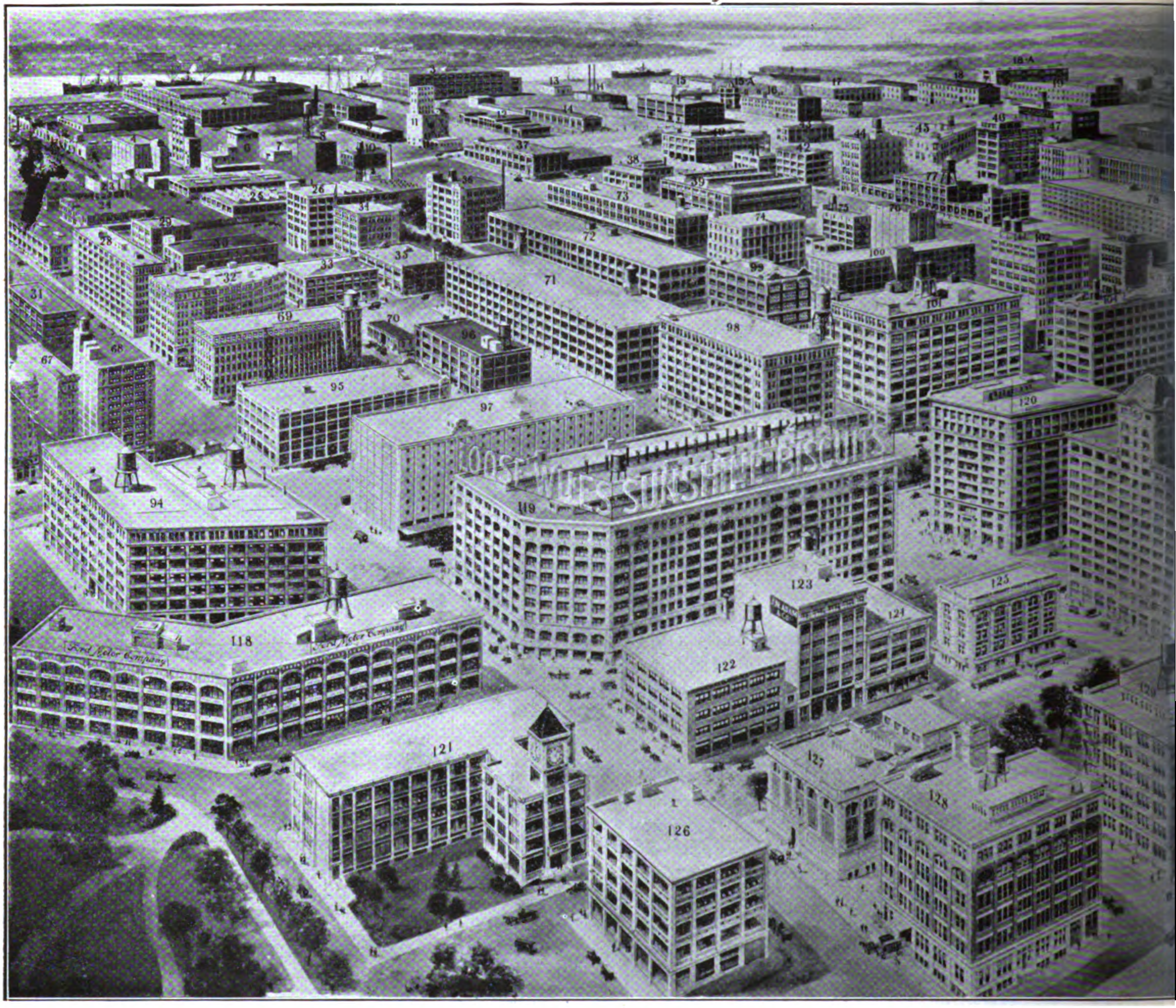
In all 14 miles of pipes were required, ranging in size from ¾ in. to 8 in. The further equipment embraces 34 six-inch dry pipe valves; four, 7,500 gal. steel pressure tanks; 4 air-compressors; four 4 inch; four 6 inch and one 8 inch check valve; four 4 in. and four 6 inch O. S. and Y. valves. All heads, of course, are of the efficient Globe pattern.

The General Fire Extinguisher Company too is largely represented by its service in the group, Grinnell sprinklers having been installed in the plants of the following named companies:

Johnson & Murray, Utica; Republic Metalware Co., Buffalo; Barnet Leather Co., Little Falls; S. Sternau & Co., Brooklyn; Thomas & Co. (Turner, Carter Co.), Brooklyn; Great Atlantic & Pacific Tea Co., Jersey City; New York Dock Co., New York City; Wallace & Co., Brooklyn; Havemeyer & Elder, Brooklyn; The S. Howe Co., Silver Creek; Jos. Stern & Sons (Morris & Co.), New York City; Standard Oil Co., Devoe Wks., Long Island City; Lehn & Fink, Brooklyn; Jas. C. Doran & Sons, Providence; Valentine & Co., Brooklyn; Revere Rubber Co. (U. S. Rubber Co.), Providence; Vacuum Oil Co., Bayonne; Hewitt Rubber Co., Buffalo; Jacob Dold Packing Co., Buffalo; Rudolph Wurlitzer Mfg. Co., N. Tonawanda; Baltimore & Ohio R. R. Co., New York City; Union Terminal Co, Jacksonville, Fla.

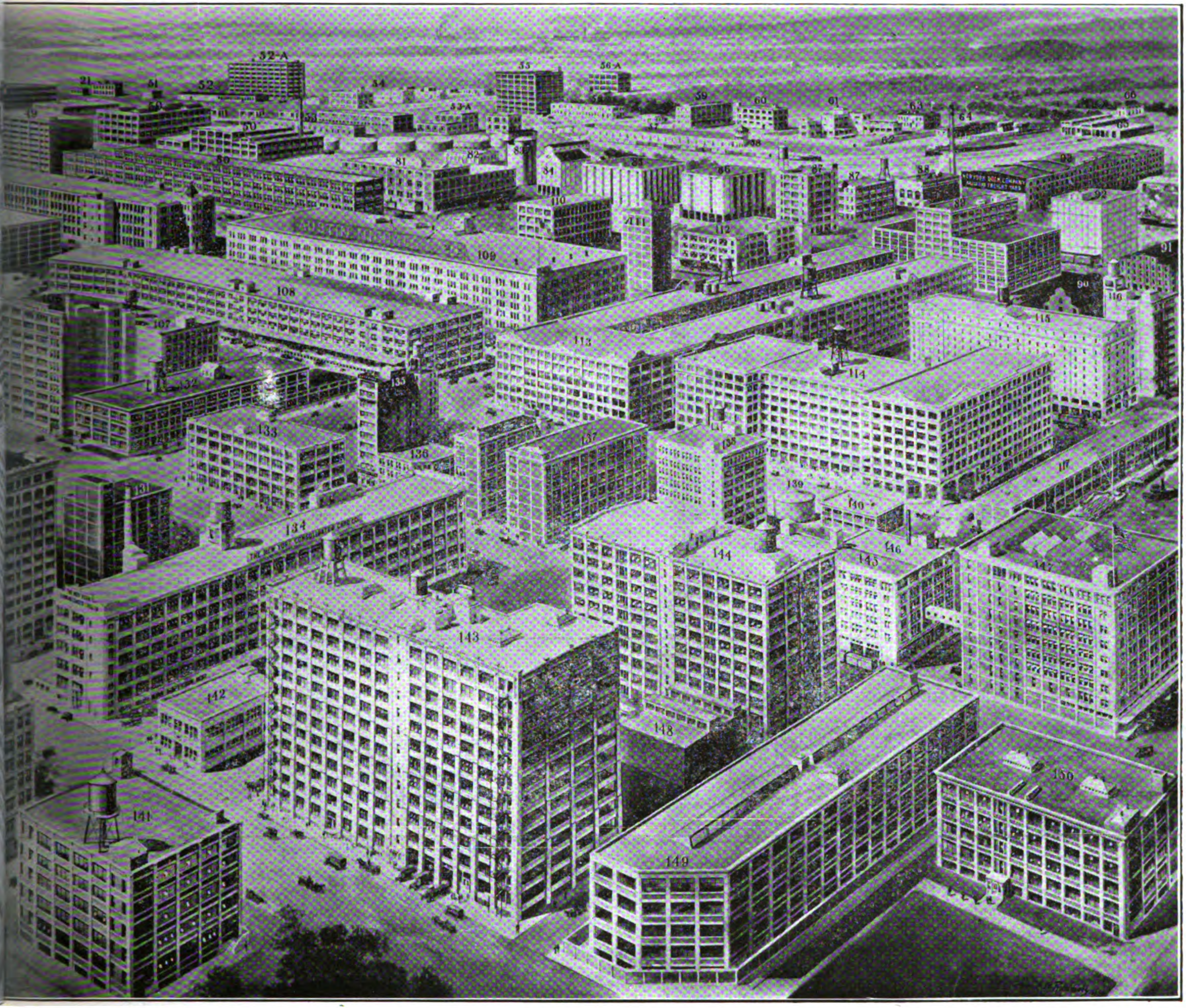
American Can Co., Baltimore; Robert Gair Co., Brooklyn; General Electric Co., Pittsfield, Mass.; Boorum & Pease Co., Brooklyn; Havemeyer & Elder (Austin, Nichols Co.), Brooklyn; Osgood Bradley Building, Worcester; C. F. Mueller Co., Jersey City; H. P. & E. Day Co. (L. E. Waterman Co.), Seymour, Ct.; Colgate Co., Jersey City; Bowker Insecticide Co. (Am. Agricultural Chem. Co.), Everett, Mass.; Naumkeag Steam Cotton Co., Salem, Mass.; Standard Oil Co. (Pratt Works), Long Island City; Seth Thomas Clock Co., Thomaston, Ct.; American Lead Pencil Co., Hoboken; Nashua Mfg. Co., Nashua; Scoville Mfg. Co., Waterbury; Wm. H. Walker Co., Buffalo; Taft Pierce Mfg. Co., Woonsocket; Norton Co., Niagara Falls; Shuttleworth Bros. Co., Amsterdam, N. Y.

LOUISVILLE, Ky., is considering a revised building code in the drafting of which the brick manufacturers of the city have been consulted. This fact insures a degree of fire-safety as well as general comfort under the proposed measures, which would be impossible if the lumbermen had their way.



ONE HUNDRED AND FIFTY CONCRETE INDUSTRIAL BUILDINGS EREC

1—Standard Oil Co., Devoe Wks.
2—American Agric'l Chem. Co.
3—Standard Oil Co., Pratt Wks.
4—Standard Varnish Wks.
5—Charles Schaefer (Grain)
6—Eugene E. Godfrey (Grain)
7—Standard Oil Co.
8—Valentine & Co.
9—Automatic Transportation Co.
10—Carborundum Co.
11—Ralston Purina Co.
12—Tuttle & Bailey Mfg. Co.
13—Borden's Condensed Milk Co.
14—Standard Oil Co.
15—Standard Turpentine Co.
16—Standard Oil Co.
17—Standard Oil Co.
18—Standard Oil Co.
19—Standard Oil Co.
20—Carborundum Co.
20a–Vacuum Oil Co.
21—Vacuum Oil Co.
22—Vacuum Oil Co.
23—American Agric'l Chem. Co.
24—Chesebrough Mfg. Co.
25—Cyphers Incubator Co.
26—A. Zerega's Sons. Consolidated.
27—Wm. Becker's Anil. & Chem. Wks., Inc.
28—Thomas & Co.
29—Rudolph Wurlitzer Mfg. Co.
30—Standard Oil Co.
31—Internat. Acheson Graphite Co.
32—Osgood Bradley Bldg.
33—Enterprise Oil Co.
34—Gr't Atlantic & Pacific Tea Co.
35—Thos. Morgan & Moran Bros.
36—Forrest Box & Lumber Co.
37—G. Schirmer, Inc.
38—American Can Co.
39—American Can Co.
40—Vacuum Oil Co.
41—Spring Brook Water Supl. Co
42—The S. Howes Co.
43—Standard Oil Co.
44—Lehn & Fink.
45—Robt. Reiner Importing Co.
46—Doehler Die Casting Co.
47—Paine Estate (Austin, Nichols & Co., Lessees).
48—J. B. Blood Co.
49—Merchants Term. Warh'se Co.
50—Carborundum Co.
51—Borden's Condensed Milk Co.
52—Borden's Condensed Milk Co.
53—Texas Co.
53a–Texas Co.
54—E. R. Squibb & Sons.
55—Republic Metalware Co.
56—Standard Oil Co.
56a–Borden's Condensed Milk Co
57—American Agric'l Chem. Co.
58—B. R. T Signal Tower.
59—American Agric'l Chem. Co.
60—Robertson Elec. Constr Co.
61—Mica Insulator Co.
62—Hewitt Rubber Co.
63—Williams Bakery.
64—Standard Oil Co.
65—Niagara Gorge Railroad Co.
66—Cayuga & Seneca Canal Locks.
67—Pioneer Warehouses.
68—Wm. H. Walker & Co.,
69—Wood & Brooks Co.
70—Wood & Brooks Co.
71—George Laub's Sons.
72—Hewitt Rubber Co.
73—American Agric'l Chem. Co.
74—Rock Plaster Mfg. Co.
75—H. P. & E. Day Co. (L. E Waterman Co.).



WITHIN FIVE YEARS BY THE TURNER CONSTRUCTION COMPANY

76—Merchants Refrigerating Co.
77—Howe Rubber Co.
78—Naumkeag Steam Cotton Co
79—Naumkeag Steam Cotton Co
80—General Electric Co.
81—Gr't Atlantic & Pacific Tea Co
82—Vacuum Oil Co.
83—Norton Co.
84—Bush Term Co. (Coal Bins) (Z. O. Nelson & Son, Lessees).
85—American Dock Co.
86—American Dock Co.
87—Barnet Leather Co.
88—Barnet Leather Co.
89—Keystone Warehouse Co.
90—Vacuum Oil Co.
91—Hooker Electro Chemical Co.
92—Buffalo Cold Storage Co.
93—New York Dock Co.
94—A. Schraeder's Son, Inc.
95—Johnson & Murray.
96—American Stopper Co. (American Can Co.).
97—Nashua Mfg. Co.
98—Colgate & Co.
99—Firestone Tire & Rubber Co.
100—Revere Rubber Co. (U. S Rubber Co.).
101—Robert Gair Co.
102—Jos. Stern & Sons (Morris & Co.)
103—James McCann Warehouse.
104—Fred Gretsch Mfg. Co.
105—Gustav Schock.
106—S. Sternau & Co.
107—James Leo Co.
108—Union Terminal Co.
109—Havemeyer & Elder (Austin, Nichols & Co., Lessees).
110—Havemeyer & Elder.
111—Ernest Flagg (Sam S. & Lee Shubert, Inc., Lessees).
112—C. F. Mueller & Co.
113—Bush Terminal Co.
114—Bush Terminal Co.
115—Baltimore & Ohio Railroad Co
116—American Lead Pencil Co.
117—Vacuum Oil Co.
118—Ford Motor Co.
119—Loose-Wiles Biscuit Co.
120—Sperry Gyroscope Co.
121—Seth Thomas Clock Co.
122—Robertson-Cataract Elec. Co.
123—Wm. H. Hotchkiss (J. N Adam & Co., Lessees).
124—Selfridge & Langford Whse.
125—Biograph Co. of America.
126—R. L. Green Paper Co.
127—Biograph Co. of America.
128—Wallace & Co.
129—Boorum & Pease Co.
130—Robert Gair Co.
131—Taft Pierce Mfg. Co.
132—Diehl Mfg. Co.
133—James C. Doran & Sons.
134—N. Y. Consolidated Card Co.
135—L. E. Waterman Co.
136—Bowker Insecticide Co. (American Agric'l Chemical Co.).
137—Shuttleworth Bros. Co.
138—Hartford Suspension Co.
139—Vacuum Oil Co.
140—The Mentholatum Co.
141—Safety Car Heat'g & Light. Co.
142—Jacob Dold Packing Co.
143—Hoboken Land & Impr. Co.
144—Hoboken Land & Impr. Co.
145—Gr't Atlantic & Pacific Tea Co.
146—Gr't Atlantic & Pacific Tea Co.
147—Gr't Atlantic & Pacific Tea Co.
148—Hoboken Land & Impr. Co.
149—Scovill Mfg. Co.
150—Buffalo Meter Co.

Helping the Government Protect its Property Against Fire

FEW realize how important a service has, and is being rendered the National Government in protecting its war stores against loss through fire by the Underwriters' Laboratories of Chicago. Something of its work was told by A. R. Small, vice-president of the organization in a recent address befor the Western Association of Electric Inspectors, in session at Memphis, Tenn.

In part Mr. Small said:

"The Underwriters' Laboratories' part in the great war is a part of two phases or divisions. The first and original part is very closely related to a subject which was discussed with this association in Toledo last year. A close analysis at the present time will show it is the greatest part that we are playing in the war. I refer to the standards of Underwriters' Laboratories. I had the pleasure of addressing a meeting in Chicago a couple of months ago, a meeting of manufacturers of acetylene appliances, and entertained them, I hope, for a few moments with the thought that the work which the Underwriters' Laboratories has previously done in co-operating with manufacturers, electrical inspectors, and others in the preparation and operation of standards had quite a significance in connection with carrying on the war. I reported to the audience and will take up your time in reporting to you the value to the United States Government of work which has been done at Underwriters' Laboratories since 1914 in co-operation with the manufacturers of cotton rubber lined fire hose.

Fire Hose for Cantonments

"Several members of the staff devoted a great deal of time in that year to a careful analysis of existing specifications for fire hose, such as used in municipal fire departments and also in private plants. An agreement was reached with the manufacturers and others interested officially as to a common specification for fire hose. That specification was put into force and gradually was applied in the factories of 12 principal manufacturers of fire hose in this country. On August 15, 1917, the quartermaster's department of the United States Army concluded that it wanted fire hose in the new training camps and wanted it badly and at once. Its attention was called through some channel—I am not definitely advised of it; I believe Mr. Mallalieu, general manager of the National Board of Fire Underwriters, may have helped materially in this direction—to the standards which Underwriters' Laboratories had prepared and promulgated and to the work which manufacturers of fire hose had been doing with the Laboratories, with the result that the quartermaster's department telegraphed 12 manufacturers of fire hose inquiring as to when they could begin to ship fire hose conforming to this specification and labeled by Underwriters' Laboratories. I am not acquainted with all the telegraphic correspondence which followed, but on the 22nd of August, 7 days after the department realized its need of fire hose, the 12 factories began to ship, and before the 15th day of November, 12 factories had shipped in excess of 1,000,000 feet of 2½-inch, single jacket fire hose to each one of the 16 principal cantonments for the National Army and to each one of the training camps for the National Guard. The manufacturers of fire hose were prepared. The reason they were prepared was because this standard had been worked out long previous to the war and in this particular case had been applied in their plants. As you know, it is the policy of the Government to send its own inspectors to every factory where Government materials are being manufactured. It was not necessary in this case for the Government to enlist, train, equip, and send to 12 factories 12 or more new inspectors who had to be broken into the work of examination and testing of fire hose. The inspectors of Underwriters' Laboratories were already active in these plants, examining and testing fire hose to be shipped to the municipal fire departments and to the plants of private property owners. As a result, the manufacturers were able to start in immediately with the production of hose, along a schedule with which they were already familiar, having the work supervised by an inspector already acquainted with the peculiarities of fire hose and the things which it is necessary to watch in testing it. Each 50-foot length of this more than 1,000,000 feet of fire hose was subjected to a pressure of 300 pounds at the factory, its elongation from 10 pounds up to 300 pounds being measured, lengths having excessive elongation or otherwise not conforming to specifications being rejected. In one case our inspector one morning turned down 20,000 feet of hose and the manufacturer had no trouble in convincing himself that the inspector's action was proper.

Insulated Wire

"Similarly, in the case of insulated wires, at the beginning of the war the Navy Department decided it wanted 3,000,000 feet of 14 duplex, lead covered, and it wanted it quickly, and it wanted it to be tested. The manufacturers of insulated wire have an active, growing organization, co-operating in a great many matters. A chairman of one of the committees of that organization pro rated the entire footage of lead cable desired to the manufacturers of lead cable equipped to produce that particular kind of material and pro rated 100 per cent. of the inspection of the finished cable to the Underwriters' Laboratories.

There again preparedness through standards of Underwriters' Laboratories was of some assistance in carrying on the war since it was not necessary for the navy to train a crew of new inspectors to go into 26 factories and learn how to inspect goods at the cost of delay in shipping them out. Our inspectors at the wire plants were thoroughly familiar with all of the problems in examining and testing lead-covered cable and the material was shipped from the factories as soon as it was practicable to make it and was delivered to the Navy Department with the least possible delay.

Roofs for Barracks, Etc.

"While in New York City in May, I was approached by an officer of one of the larger corporations manufacturing prepared roll roofing in this country. That gentleman had just left a meeting of his associates in the prepared roll roofing business. They had been requested by the National Council of Defense to draw up specifications for 2-ply rubber roofing to be furnished the quartermaster's department for use on all of the barracks, hospitals, and other plants in each one of the National Army cantonments. What specification could they furnish so that all of the 47 manufacturers of roll roofing in this country from the Atlantic to the Pacific Coast would have a square deal, the Government would have a square deal and the quickest possible delivery of the large amount of this material desired could be made? The manufacturers reported after an all-day session that the best specification they could urge was the Underwriters' Laboratories' Standard for Prepared Roll Roofing with the result that that specification was adopted by the National Council of Defense, and at the request of the manufacturers of prepared roofing, to see that the inspection of that material was carried on in a uniform manner, Underwriters' Laboratories has examined and labeled roll roofing in the amount of more than 70,000 acres during 1917. Seventy thousand acres of 2-ply roll roofing have been delivered to the United States. Over 2,000,000 rolls of over 100 square feet each, each roll of it having been opened up and examined and tested at the factories by inspectors of Underwriters' Laboratories and found to conform to specifications as to amount and quality of rag felt employed, as to the melting point, ignition point, flash point and other characteristics of the saturating material.

Other Matters

"I could go on in this manner I suppose for 40 or 50 materials and tell you of instances where the United States Government, representatives of the War Department, the Emergency Fleet Corporation, or the Navy Department, have wanted to put their hands immediately upon some existing, useful, proven specification for a device or material and have resorted finally to a specification prepared at Underwriters' L boratories, in use at Underwriters' Laboratories and applied at factories by Underwriters' Laboratories. A very recent instance of that kind was a request of the Emergency Fleet Corporation for a specification for cartridge enclosed fuses. The Emergency Fleet Corporation, as I understand it inquired of the Bureau of Standards as to where it would find a proper and sufficient specification for cartridge enclosed fuses, many millions of which are to be supplied to the new shipbuilding plants throughout the country. The Bureau of Standards, I think very kindly, referred the purchasing agent of the Fleet Corporation to Underwriters' Laboratories stating that Underwriters' Laboratories had prepared with the co-operation of enclosed fuse manufacturers a complete standard on that device. We were requested to furnish a copy of the standard, which we did. The first order that I know of of the Emergency Fleet Corporation for enclosed fuses required that they should conform to standards of Underwriters' Laboratories.

"I took quite a little of your time last year at the Toledo meeting to explain to you how these standards are compiled, how the manufacturers of appliances take an important share in their formulation, in their promulgation and in their enforcement. Underwriters' Laboratories does not deserve too large an amount of credit for having these standards. It has been necessary for us to have them in order to conduct our business in a manner in which it could receive your support, as it has enjoyed your support for so many years. Nevertheless, we feel that the fact that we have the standards, that we have been working on them for a number of years, and fortunately that many of them are available for instant use by the Government, has been of some little value in carrying on this war to date.

Men in Service

"The other phase of Underwriters' Laboratories' part in the great war is one which I feel that we have very little right to brag about, because every one of you, every one everywhere, every loyal citizen, every corporation or organization composed of loyal citizens is taking a similar part in this great war. Out of a staff of 120 people at the Chicago plant, out of a staff of 26 additional people, I think it is, at the Pittsburgh, New York and Boston offices we have on our service flag 31 stars. (Applause.) It was our original hope or thought at the beginning of hostilities that the activities of Underwriters' Laboratories would be such in connection with our close and necessary co-operation with the Bureau of Standards at Washington, and other Government organizations that the members of our staff would feel that an opportunity for service existed in remaining with the staff. Many of the men have felt the call otherwise. They have been sent out with a glad hand while the remaining members of the staff have undertaken to discharge the volume of work pressed upon them without additions. We, each of us, have felt, as no doubt all of you have had occasion to feel, that our own individual bits in carrying on the great war was for us to divide up and assume the load of the boys who have gone out in uniform and we have not taken on at the Chicago plant a single man to replace people who have gone but have divided up the work of those in the service among those of us who remain, we hope without any serious delay in the delivery of our goods. This policy was not possible at the New York office, where Mr. Pierce, whom so many of you know, is in charge, has had the misfortune, if you can call it that, I believe he doesn't, of losing 10 men out of 11 to go into uniform and that one remaining man could not discharge the work that the other 10 have been doing.

In constant touch with government departments.

"We are in constant touch with one or the other departments in Washington. It is my own privilege to correspond with some engineer of the Bureau of Yards & Docks, some engineer of the Quartermaster's Department, some representative of the Fleet Corporation almost daily, sometimes several times each day, giving them what information is available in our records and from the experience of the members of our staff on almost everything from oxygen acetylene welding or cutting plants to roll roofing, from rubber hose to methods of testing molded insulation, from actual factory inspection work on cartridge enclosed fuses to how to install a fire door. It may not be news to any of you that on the shores of Chesapeake Bay and in the Jersey meadows they are erecting many large depots for the storage of ammunition of one kind and another. Similar depots are being erected in France. Each one of these depots has a number of tin-clad doors on them to prevent the spread of fire from one depot to another. These doors are all hung with Underwriters' Laboratories' standard fire door hardware. The doors themselves are all Underwriters' Laboratories' standard, are inspected at the factory and labeled. Very often the Government has need for special information as to how this or that particular form of device will work. There have been a number of serious fires in warehouses of different kinds and it is now planned to equip all Government plants with a special form of fire extinguisher. The installation of automatic sprinkler equipment, I understand, has been considered as too expensive, but a special form of fire extinguisher is to be installed in each one of them. The engineers of Underwriters' Laboratories are being consulted daily as to how fire extinguishing appliances can properly be applied in these warehouses for their protection. Manufacturers of hand extinguishers are working night and day turning out the standard appliances which are inspected, tested, and labeled by the Underwriters' Laboratories before these devices are accepted by the Quartermaster's Department or the Navy Department for delivery. Each member of the staff of the Chicago office has an opportunity in some way to serve directly. Many of us feel that we would like opportunity to serve more directly. I presume in that feeling we are in no way different from any one of you in your own business."

Thirty-eight Class Room School

APPROVAL by the State Board of Education having been secured of the plans prepared for a new public school building at West New York, N. J., the erection of the structure will be pushed to completion.

The proposed building, of which William Mayer, Jr., and Edwin F. Manahan are the associate architects, will contain 38 class rooms, and in addition a room each will be devoted to the kindergarten and manual training departments, and for the convenience of students in the fresh air class. Further there will be a combination auditorium and gymnasium, the seating capacity of which is placed at 1,500 persons.

The exterior walls will be of brick construction, while partitions are to be of brick, terra cotta and plaster blocks. Floors and roof are to be fireproof, the Burchartz system or its equivelent being called for.

The estimated cost of the structure is placed at $230,000, and when completed it will be a distinct ornament to the community, and will add yet another to the firesafe public school buildings so sadly needed in all parts of the country.

Storage Facilities for Army Supplies

TO afford storage accommodations for the vast quantities of supplies required by the army and navy, it is planned to take some five hundred residence buildings in the various boroughs of New York City, altering them to meet their new use to which they will be devoted.

It was first intended to erect new storage warehouses, but the need for space became so urgent that the conversion of dwelling houses was decided upon.

George W. Jackson, an engineer of long and valuable experience, has opened an office at Chicago, and is prepared to design and consult with architects and others regarding engineering propositions.

*Economy in the Design of Reinforced Concrete Buildings**

By Clayton W. Mayers, of the Aberthaw Construction Company

Part III

(Continued from March Issue)

Flat Slab Floors

Flat slab floor construction is fast replacing the beam and girder type of floor, and generally speaking, has advantages in appearance and economy. However, there will be places where the beam and girder system will show a lower cost. Where panels between columns are square or nearly so the flat slab usually works to advantage. When columns are spaced unequally or irregularly it is often more economical to resort to the beam and girder type of floor. If the column spacings may be laid out with economy in view, the square bay and the flat slab will generally be selected. However, this selection should not always be made without a proper check by comparative cost estimates. Assume, for instance, that a concrete storage building is required the width of which may be anywhere from 55 to 65 ft. and sufficient in length to give a certain specified area of floor space. The design is to be a flat slab system and the building is to be built as economically as possible. The engineers will usually make a design for a flat slab system with the columns spaced at distances he believes will show economical results. Two more flat slab designs should now be made with the column spacings one foot more and one foot less respectively. Comparative costs made on these three designs will show the economical standing of the various spacings for the specified live load, and if it does not show definitely which spacing to use it will give the hint as to which extreme of column spacings the engineer must still continue to design. It will be necessary to make typical cross-section designs showing the column spacings considered and then calculate the comparative costs of each design for a length of building equal to one bay. It is a simple matter to calculate the required length of the building for each type of cross section considered in order that the proper amount of floor space be obtained. The total length of the various buildings should be calculated to the nearest multiple of the length of their respective bays. This being done and the cost of one bay of each type of building being already calculated, the total approximate cost of each type of building is easily found. Adding to these respective estimates the cost of closing in the two extreme ends of the building, the engineer has a very good idea of the comparative costs of the designs he has made.

Special Problems

The principal elements going to make up the cost of a concrete building have been briefly touched upon, with a few illustrations of the methods of making cost comparisons. It is believed the designer will now be able to cope with special problems in a similar manner, always trying to make actual cost comparisons bear out his decisions whenever it is possible to do so.

The use of rods 11-16, 13-16 and 15-16 inches in diameter should be discouraged, as it is difficult to obtain these sizes. When these unusual sizes appear on the plans the estimator is likely to protect himself by estimating the reinforcement at an increased cost.

Care should be taken to so design the beams in a roof slab, and that the width will be the same as those in the floor below. By doing this it makes it possible to use the same forms for the roof as were used for the floors, the only change necessary being made on the beam bottoms. The saving in cost made by reusing, without alterations, the floor forms for the roof more than offsets the extra cost of the concrete used in the roof beams.

Effect of Local Conditions on Costs

The locality of the job in hand plays an important part in the design and cost of the work. Cost comparisons should not be made without regard to this special consideration. Low-priced gravel may take the place of sand and crushed stone. Cement may be unusually cheap owing to very low freight rates. Sand may be procured from a sand bank nearby or possibly from the footing excavation. Crushed stone may be had from a crushing plant close to the site of the job or it may be excessively high in cost. Reinforcement costs may be extremely high on account of transportation. Any one or all of these conditions would influence all concrete units. These local conditions and prices should be studied by the engineer before starting his design. If he does not do so his cost comparisons may not, after all, lead to the correct conclusions.

It was found in making comparative estimates of two systems of floor construction, that when the quantities were priced at the rates prevailing in Buffalo the costs of the two designs were about the same. When New York City prices were applied to the same designs a saving of about 8 per cent. of the cost was shown in favor of the design calling for the least concrete and the most reinforcement.

Fluctuation of Unit Costs

Unit costs of labor and materials for all classes of building construction are constantly changing, and it is hardly to be expected that one whose business is not entirely estimating be kept well informed of the many fluctuations. However, it has been shown in this article that the designer does not have to use absolutely accurate unit costs in order to determine by comparative estimates, the relative economic standing of his designs. A review of the market conditions from time to time in a general way will give him enough information to revise his unit costs in order that his comparisons may show more accurately the true status of his work. The prices tabulated and used throughout this paper, as before mentioned, are much higher than the prices of two or three years ago. It is quite possible that two years hence they may undergo another change equally great, and the engineer must look out for this and act accordingly. Five years ago the ratio of cost of concrete, forms and steel in a building was roughly 2:2:1. To-day it is about 2:1:1—that is to say, five years ago and the total cost of the concrete about equalled the cost of the forms, and the reinforcement equalled about one-half the cost of either. Today, the cost of the concrete in a building is slightly less than twice the cost of the forms, and the cost of the reinforcement is about equal to the form cost. It is quite probable that five years from now the ratio may be again changed.

Conclusion

In this paper many designs might have been made and the comparative cost of each design calculated. Building layouts might have been discussed at length with a view to economy of construction. Economical column spacings for flat slab designs for various live loads could have been worked out. However, with the engineer governed largely by specific conditions, building laws, fiber stresses, etc., it would be difficult, indeed, to cover the subject even in a general way, in a paper many times the size of this one. Therefore, it was thought best to give most of the space to methods of estimating the comparative costs of the principal members which go to make up a concrete building, and not deal specifically with the layout of the building. Again, mention is made of the fact that the designs and quantities used here to illustrate the methods of comparative cost estimating are in no way to be viewed from an engineering standpoint. These examples are intended to be of value only in so far as they serve for illustrative purposes and must not be considered as solutions to engineering problems. It is not within the scope of this paper to lay down rules for concrete design but rather to define and illustrate principles by which the accepted rules may be economically applied. If the engineer has in hand the application of these principles, he can solve the question of economy in his layout for himself.

In writing this paper it is not intended to try to make building estimators of all designers of concrete buildings. It is, however, hoped that it will arouse the interest of the designer to a keener desire to know the cost of his designs, and to promote the practice of comparative cost estimating among designing engineers. Such practice, if conscientiously followed, will be extremely helpful in enabling the designer to choose wisely, and at the same time imbue him with a new confidence that his work really contains the most economical methods to achieve his purposes. He will get a new perspective of his work and develop to a greater degree the capacity for thinking in dollars and cents as well as in stresses and strains. His work will become more interesting and his services of more value. It was with this in view that this paper was conceived, and the effort will be well worth while if this purpose has, even in a small way, been accomplished.

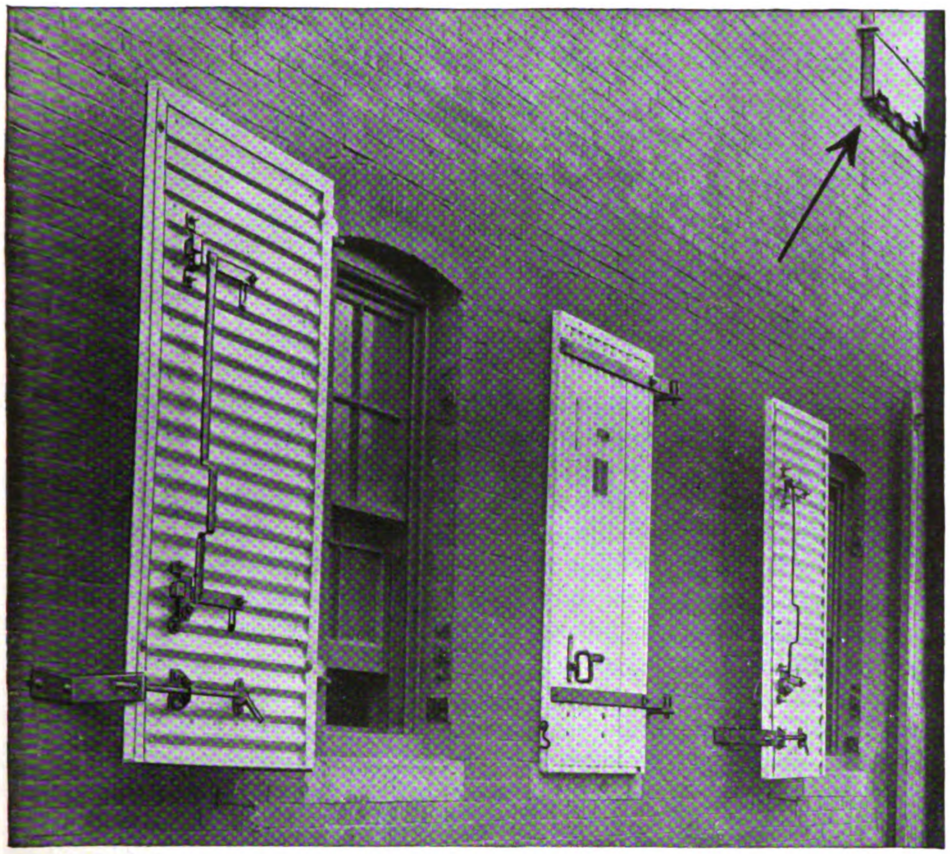
"Almetl" Fire Doors and Shutters

TO meet the legitimate demand for particulars concerning "Almetl" fire doors and fire shutters the manufacturers of these appliances, the Merchant & Evans Company, of Philadelphia, has issued a new catalogue, replete with illustrations and text description of its doors, shutters and famous ventilators.

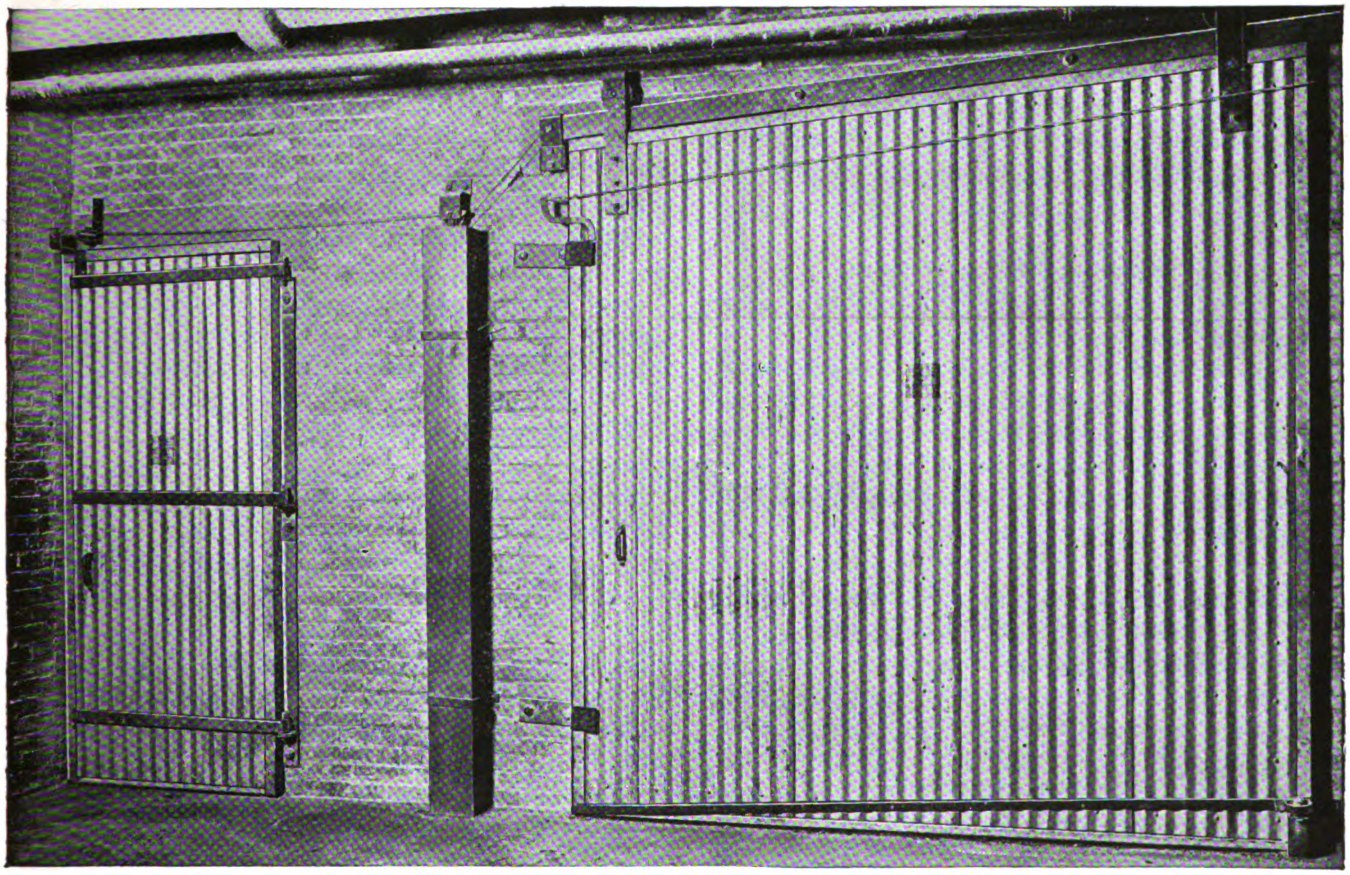
The importance of proper protection in wall openings is indicated by the fact that "one-third of all fire insurance charges in cities are for exposures."

The doors and shutters of the Merchant & Evans Company have passed the rigid tests of the Underwriters' Laboratories, and the Mill Mutual offices, and bear the approval of both. Of all steel construction, the doors having "no tin to rust, no wood to rot, no thin covering to bruise," stand the severest tests to which they are subjected, and defy the progress of the flames.

Upon the opposite page we present a view both of the Company's latest fire door and its shutter. Besides its doors and shutters the Merchant & Evans Company manufactures the famous Star ventilators, which have been upon the market for years, and are to be found upon many of the foremost mercantile and industrial properties in the land.



Latest type of "Almetl" steel shutter and fire door manufactured by the Merchant and Evans Company



A Department Devoted to the Use of

AUTOMATIC SPRINKLERS

Edited

IRA G. HOAGLAND, Secretary **PAUL MASON, Special Representative**

National Automatic Sprinkler Association

What Is "Fireproof"?—And When Is It?

WHAT is "fireproof?" Words have—or should have—definite meanings; yet Webster's Dictionary throws as much doubt on the meaning of "fireproof" as there is of the "fireproofness" of most of the buildings that bear the "fireproof" label. That authority on lexicography thus defines:

"Fireproof—Proof against fire; relatively incombustible. Fireproof is often, if not generally, used, in a comparative sense, of slow-burning structures or materials, or those difficult to ignite. Its general meaning, as applied to a residence, a modern office building, an ordinary safe, and a bank vault, represents varying degrees of immunity from fire."

There was a fire in Kansas City (Mo.), the other day, that reached conflagration proportions. Forty-seven buildings were destroyed or damaged. A report to an insurance journal said:

"The section burned is west of the old Union Depot, where most buildings are vacant and in serious disrepair. The valueless block was protected by the Brokers' Warehouse fireproof building.

"Comparatively new fireproof buildings checked the fire to the southward, and prevented its spread to the district housing a large number of implement wholesalers."

Protection Failed to Protect

Further on, commenting on the loss of a wholesale grocery company, the report said:

"The company occupied two buildings, one of which was destroyed. The other building (in two sections) a large, modern fireproof structure, was not seriously damaged, but the contents stored in one end suffered a loss of about $250,000. Much of this was food stuff for the army."

So it is seen that the "valueless block" (which burned) was "protected" by a "fireproof" building, and that another "fireproof" building not only permitted the destruction of $250,000 of its contents, but also was itself damaged, although "not seriously."

Hence, the reasonableness of the question—"What is 'Fireproof?'"

Popular fancy synonymizes "fireproof" with safety from fire; invests incombustible materials of construction with mysterious power to impart their characteristics of fire resistance to completed and occupied "fireproof" buildings. This seems to have been the case to an unusual extent, in Kansas City.

"It's absolutely fireproof; it cannot burn," is the familiar declaration of the owner of a "fireproof" building that contains enough fuel in combustible contents to keep an ocean liner steaming for several days.

Sometimes a building is "fireproof," all except—

And the exception means its destruction.

Destruction of a School

A few years ago a handsome "fireproof" school building was erected in Philadelphia—all except a wooden tower; so built to save a little money on structural materials. The high school chemistry department was located in the first floor of the tower, whose top stories were utilized to store the priceless chemical records of a great university—because this was a "fireproof" building.

One night fire started in the chemical laboratory, which was destroyed, with the chemical history of almost a century, stored above, and the fire swept through and gutted the two top stories of the building. And everyone wondered that a "fireproof" building should burn.

The Triangle Shirt Waist Factory fire took fearful toll of human life in a "fireproof" building, and the Edison Works fire at West Orange blazed unrestrained through nine "fireproof" buildings in seven hours. These instances might be multiplied almost indefinitely, but they are sufficient examples of the fact that it is *not the function of a "fireproof" building to safeguard its contents.*

The merits of "fireproof" construction are not to be questioned, but whatever these merits are, they cannot comprehend incombustible building material as a sufficient assurance of safety from fire in an occupied "fireproof" building.

Manufacturers of incombustible building materials often announce that "maximum fire protection" will be assured by the use of their products. How can this be so, when maximum protection against fire comprehends not only the incombustion of structural materials, but also active control of the fire itself; and all that can be expected of incombustible structural materials is passive resistance? They cannot, by any stretch of imagination, be considered as having any effect on the burning of combustible contents.

"Fireproof" Needed Fireproofing

In the fall of 1916, in a New York suburb, a seven story "fireproof" storage warehouse was gutted and almost destroyed by a fire which is comprehensively epitomized in this conclusion in a report prepared by Prof. Ira H. Woolson, consulting engineer to the committee on construction of buildings of the National Board of Fire Underwriters:

"The one fact which stands out above all others in connection with this fire is that a suitable sprinkler system would have saved the concrete building with its contents and probably have controlled the fire in the frame building. It is one more demonstration of the folly of depending upon fire-resistive construction alone to protect inflammable contents of a building from fire. The owners had evidently made sincere efforts to have a very safe structure. It was in general well built; wired glass windows were provided on all sides; the protection of vertical openings was standard; double approved fire doors were provided on communicating doorways; sets of fire pails properly filled were scattered about each floor, but were useless because of the smoke which entered the building preceding the fire. With all these precautions the building is today badly wrecked; a large proportion of the contents is ruined either by fire or water, and a total property loss of $125,000 or more has been sustained. Only a portion of this is covered by insurance and the business of the owners will be more or less paralyzed for many months. All this could have been saved by a comparatively small investment in sprinkler protection."

Effectiveness of Sprinklers

A "fireproof" building is—completely—when sprinklered. This truth was thoroughly demonstrated in the Kansas City fire, just as the weakness of unsprinklered "fireproof" buildings was again emphasized. The report heretofore quoted has this to say of the efficacy of sprinkler protection:

"Sprinklers and wire-glass played an interesting part in checking the flames. The large fireproof building occupied by the Kansas Moline Plow Company, did not have wire-glass in all the windows exposed to the fire; but the sprinkler system checked the fire that got into the building."

So again it was demonstrated that **a "fireproof"** building is—completely—when sprinklered.

National Fire Protection Ass'n

(Continued from page 106)

Special studies are made of the effects of fire on concrete and other buildings of fire-resistant construction. Bulletins are issued regularly covering the hazards of holiday decorations and Independence Day and the seasonal hazard of the defective or uncleaned chimney. During each year many individual reports on specific topics, individual papers, etc., are sent to members, besides copies of all the association's standards as soon as they are promulgated. Any information in the files of the association, accumulated during its nearly 23 years of activity, is sent to any member on request.

Center of Fire Control Thought

The office of the association is the source of, or clearing house for, all that is authoritative on the subjects of fire waste and fire control.

The Association's membership is composed of architects, builders, merchants, manufacturers, warehousemen, engineers, fire marshals, fire wardens, fire chiefs, electricians, credit men, bankers; insurance managers, agents and inspectors; boards of trade, chambers of commerce, public libraries; civic, mercantile and industrial and trade associations, and many other organizations, corporations, firms and individuals interested in or whose interests touch or are touched by fire problems.

There is no admission fee for membership. The annual dues of $6 cover all the charges for Association account and entitle the member to all Association publications, including the Quarterly. The membership year is from the date of the member's election, and any individual, firm, corporation or society is eligible.

The office of the Association is at 87 Milk Street, Boston. Requests for information or literature, sent to Secretary F. H. Wentworth at that address, will be welcomed, and promptly complied with.

CUT off from the European markets by the war Colombia has been purchasing a substantial quantity of construction materials and supplies from the United States. If this promising market is to be retained and extended by our manufacturers and supply dealers, painstaking attention to the requirements of the Colombians must be given. The subject is dealt with in a special report by agent W. W. Ewing, and issued by the Bureau of Foreign and Domestic Commerce, of the Federal Department of Commerce.

A valuable aid in the fight against the Huns is a sprinkler protected plant.

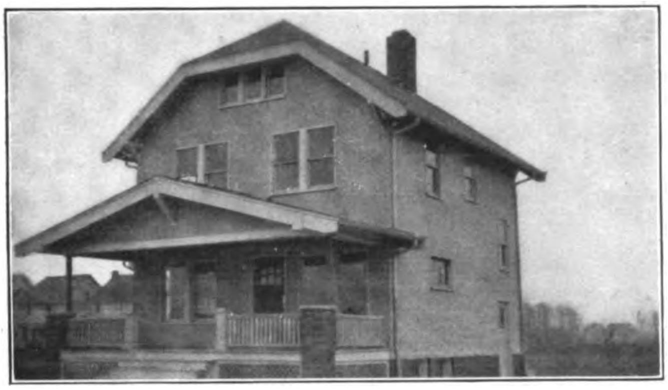
SAFE HOMES

***Edited by* RALPH P. STODDARD, Secretary**
Society Advocating Fire Elimination

Types of Homes That Are Growing in Popularity

THE two houses illustrated herewith represent a type of construction that is being used by builders in many places to produce a fire resisting house in competition with the cheaper grade of frame dwelling.

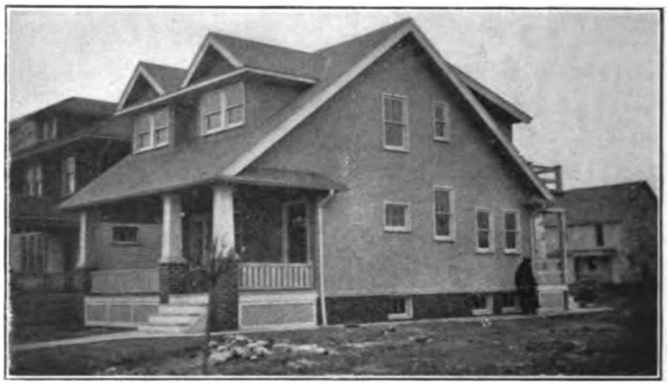
These houses have an exterior of frame stucco and roof of slate or asphalt, and while not offering the same degree of fire resistance that does the masonry wall or the metal lath stucco, it does produce an attractive house, and one that is in many respects better and safer than frame. These houses are being sold, complete, at a price the same as frame houses of equal sizes. Even the same contractor in some cases erecting the same types puts an equal price upon them claiming this house can be built as cheaply as a frame house. They have the added advantage of not requiring paint or repair on the outside.



The bungalow type house shown here has a large living room across the front, dining room and kitchen on the first floor, three bedrooms and a bath, and unusually large closets on the second floor. There is an inclosed rear entrance with refrigerator room; the house is finished with hot air heat, electric fixtures, decorating, grading and seeding, at a sale price of $6,200 including lot which in itself is valued at $1,200.

The smaller house has living room and dining room in front, three bed rooms and bath, and is finished in the same manner as the other house. The sale price of this house upon a lot of equal value with the other is $6,000.

The stucco finish on both these houses is of the pebble dash variety, crushed granite being thrown into the last coat of stucco, while it is "green." This produces not only an attractive finish, but is one that is remarkable for its resistance to the elements.



One contractor of Cleveland has kept a very accurate account upon the cost of this frame stucco construction. One plan which he duplicated many times in various types of construction showed an actual cost approximately $100.00 less for the frame stucco than for the all frame house. In the frame stucco paper sheathing with wood lath attached is fastened to the studding on the outside, and this is covered with two coats of stucco with the rock facing on the second coat. This takes the place of the wood sheathing, building paper and clapboard with its two or more coats of paint required to complete the frame house, and counting only the original painting it costs more than the stucco.

In these days of rather high prices many builders have found it necessary to resort to something of this kind to compete with the very low cost type of dwelling and the construction is becoming popular in many localities.

No Wood to be Used in New Court House

A NEW county court house is to be built at Ivanhoe, Minn., the plans for which are being prepared by Architect J. A. Burner, of Minneapolis. While all retails of construction have not yet been settled, Mr. Burner assures us that the intended structure will be "absolutely fire-proof, no wood being allowed for use in any portion of it.

This decision to build of fire-resistive materials only, is most creditable to all having to do with it.

Safe Homes for Shipbuilders

SAFE construction has been specified by the Emergency Fleet Corporation in the execution of the initial housing project for its monster army of shipbuilders. This building operation is to be on the outskirts of Camden, N. J., where it will construct at least 1,000 houses for workmen employed at the yards of the New York Shipbuilding Company, which has contracts for scores of vessels of various types for the Shipping Board. This is the first step in its plan to provide model housing for shipworkers at all yards doing work for the Government, where present housing accommodations are inadequate. Fifty million dollars have been appropriated for this purpose, insuring "good housing" operations on a scale never before even dreamed of.

Funds for these Federalized housing undertakings will be furnished by the Government to obviate necessity for diversion by the various shipbuilding companies of funds available for extensions to yards and shops. In the case of the Camden project, the actual work of construction will be done by a company known as the Fairview Realty Company, organized for the particular purpose of carrying out this work. The Company is financed by the New York Shipbuilding Company with funds furnished by the Government. A feature of this Company's operating agreement with the shipbuilding company, is that it is to be conducted without profit and that its income, after payment of taxes, insurance, etc., goes to the payment of interest to the Government at the rate of 5 per cent. per annum. The loan from the Government is to be liquidated within ten years. The Government will hold mortgage on the entire property.

The Camden "model town" is to be virtually a city of itself. The site comprises more than 150 acres. The plans call for stores, schools, churches, playgrounds and public buildings. A boulevard system connecting with that of Camden is a feature of its planning.

Drawings of the various buildings and types of houses have been completed under direction of W. G. Luce, consulting architect for the Emergency Fleet Corporation and bids are being taken. Owing to scarcity of materials and workmen, but few of the dwellings will be for one family. The great majority will be semi-detached and will house from two to ten families. All buildings will be consistantly fire-safe, with brick walls and fire-resisting roofs. Wood shingles, it is declared, will be barred. And not only are the initial buildings to be fire-safe, but rigid restrictions are to be imposed on future builders within the tract, which will insure its future safety, according to present plans. Officials of the Emergency Fleet Corporation are quoted as saying they consider the project a permanent one and, in addition, have adopted the fire-safe principle as an added surety for Government funds invested in the enterprise.

When completed, the houses will be placed on sale upon easy terms to those who desire to establish themselves permanently. Others will be rented upon a basis of a fixed charge per room of certain size, taken as a unit. While initially there will be no profit either to the Government, shipbuilding company or the real estate company, at the end of ten years the latter will have what it is believed will be an exceptionally good rental property—provided the entire tract has not been disposed of to permanent buyers, meanwhile. It is believed, however, this latter case will have developed, as the high quality of the buildings and the careful restriction of the community are expected to attract a permanent home-owning class of workers.

Bids from a number of contracting companies of National prominence are being received and will be opened within a short time. Work will be rushed, once the contract is let, and despite careful inspection, which obtains in Government construction work, it is anticipated the homes will be ready for occupancy in record time.

Those interested in safe construction express great satisfaction with the action of the Government in standing for non-burnable construction. While the shipping board officials have not declared themselves openly as being committed to any certain class of materials, their action in this case is taken as an indication of their preference and as a promise of a continuance of the "safe" principle in the construction of the many other housing projects they have in contemplation.

Woolworth Builds Marble Mansion

PROFITING by the lesson taught by the rapid burning of his spacious wooden home a couple of years ago, Frank W. Woolworth, of 5 and 10 cents store fame, has had erected upon the site of the destroyed residence at Glen Cove, L. I., a fine marble mansion.

The new property is of Italian style of architecture and is constructed of steel and white marble, the latter all American hewn. The building contains fifty rooms, the majority of large dimensions, and is reputed to have cost in excess of $2,000,000. Having had one disasterous experience with a wooden building, Mr. Woolworth is determined not to have another.

Masonry Built Homes mean Comfort, Safety and Economy

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

The finishing touch to a well-built house

A REAL roof must be more than a watershed. It must, like any artistic thing, have texture—be good to look upon. It must have character of line—a national individuality. It must have color—neutralized color—properly distributed. It must be permanent.

Johns-Manville Asbestos Shingles attain all these ends. To the graceful free lines of the shingle roof, so distinctly American, they add the permanence and fire-protection of asbestos. The soft warm colors, mingled in the laying to form what we term a "Colorblende" roof, harmonize with the natural surroundings with the restful unobtrusiveness of a weathered roof and crown any architectural scheme with all the charm that could be obtained by an artist's brush.

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The Fireproofing News

CONTAINING DETAILED DESCRIPTIONS OF NEW DEVICES AND APPLICATIONS OF MATERIALS WHICH ARE OF REAL VALUE IN FIRESAFE BUILDING: ALSO NOTES ON THE LATEST BOOKLETS, CATALOGS AND OTHER FIRESAFE LITERATURE, WITH OTHER ITEMS OF INTEREST TO THE FIREPROOFING FRATERNITY

LATEST EDITION

Copyright by Constrvction Publishing Co., of New York, N. Y., 1916

New York City, N. Y., April, 1918

Priceless

FIRE—THE KAISER'S ALLY

State Fire Marshal L. T. Hussy, of Kansas, is recognized as one of the most active and intelligent of the country's fire prevention officers, and his activities have aroused the citizens not alone in his own State, but of other commonwealths as well, to a partial appreciation at least, of the seriousness of the fire waste and the obligation resting upon every worthy citizen to reduce this economic drain.

Always interesting, the latest annual report of Marshal Hussy is particularly so, replete as it is with figures and other data concerning fire losses in Kansas during the past year, and advice as to how future safety in such connection can be attained.

Because of its nation-wide application we reprint herewith Mr. Hussy's admirable article entitled: "Fire—the Kaiser's Ally;" and commend its attentive perusal to readers of CONSTRUCTION.

"The year 1917 has been one of the most eventful and epoch-making in the history of the United States. On January 1, 1917, this country was at peace with all the world and the mass of our people hoped and believed that we would be able to continue at our peaceful tasks in spite of the world conflagration that was sweeping over the face of Europe.

"Early in the year those hopes were dashed to pieces by the resumption of ruthless submarine warfare by Germany and by the collapse of Russia. The civilized world was in danger of destruction at the hands of the German imperialists and America entered the war.

"This nation is now engaged in the most terrific and bloody struggle that the human race has ever known. Arrayed on one side are Germany, Austria and the unspeakable Turk, as the last bulyark of autocracy in a world of growing democracy. On the other side are the free peoples of Western Europe and America fighting desperately for th right of all civilized races to govern themselves as they see fit.

"Once again the issue of the centuries is to be fought out in a welter of blood and steel. Once again the human sacrifice is laid upon the altar of the gods of war 'that government of the people, by the people and for the people shall not perish from the earth.'

"Whatever may have been our opinions before we entered the war, we are now in. We have put our hand to the plow and we dare not turn back. We have cast our lot with the Allies and with them we must fight wholeheartedly and to the last man and the last drop of blood. Defeat now would lay the world at the feet of the Kaiser and the mailed fist would rule with blood and iron over the nations of the earth.

"This nation must mobilize in the most effective way possible its tremendous resources of men, of food and of munitions of war. Not one ounce of energy, not one measure of resource must be wasted. This war is not a holiday undertaking. It is stern and gruelling business.

"Methods of warfare have changed tremendously in the past hundred years. Where once nations supported at the most a few hundred thousand armed forces in the field, to-day armies are numbered by millions instead of thousands, and modern implements of warfare are so highly developed that whole nations must be mobilized for war work in order to supply the men in the trenches with guns and munitions.

"Existing factories must be expanded and run night and day, while immense new plants are built and run at high tension twenty-four hours a day, seven days in the week.

"Notwithstanding the taking away of men for military service and for labor in ship yards and munition factories, the farms must be made to produce more abundantly than ever before.

"An incessant stream of food and munitions must be poured into Europe with lavish hand. The nations that have been at war for nearly four years are heavily handicapped in the production of food. Most of them were not self-supporting in food supplies even before the outbreak of the war. To add to the peril of the situation the submarine is sending to the bottom of the ocean every day enormous quantities of food supplies shipped from this country to France and England.

"For fifty years the American nation has been becoming ever more and more a nation of wasters. Our splendid resources have been poured out like water in numberless useless ways.

"To-day we are brought face to face with a world crisis whose outcome may depend upon our ability to conserve the last dollar and the last crust of bread.

"Useless work and effort must be dropped. Waste must everywhere be eliminated. All other interests must be made secondary to our supreme task of winning the war. We must say with Paul, 'This one thing I do, forgetting the things which are behind, and reaching forth unto the things that are before, I press toward the mark.'

"And what has all this to do with the annual report of a State Fire Marshal? Simply this: that a rising tide of flame is menacing wharf and dock, mill and warehouse, ship yard and munition plant. To the careless and neglect of ordinary times is added the menace of labor disturbances, munition explosions, I. W. W. activities and enemy alien incendiaries. Fire is the kaiser's ally and the Fire Marshal is here to fight fire."

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This hand-book is filled with original drawings, complete descriptions and specifications for standard Metal Lath construction, showing the use of Metal Lath. Having a copy any architect, builder or owner can use Metal Lath for his work, according to the best practice as adopted by engineers and contractors widely experienced in its use.

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Please make your request on your letterhead, as the edition is limited and we want to distribute to those who can get the most benefit from the book. Mention this paper please.

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Stop Building to Burn

Last year the national fire loss was over $225,000,000. In other words, the value of the property burned up was equal to a fleet of more than 450 vessels, each worth $500,000, and having a carrying capacity of 3,500 tons. This represents man power and property lost beyond recovery. It is just as necessary and as patriotic to prevent fires as it is to buy Liberty bonds. Money saved by reducing fire losses and avoiding the tremendous cost of fire protection would purchase a large block of Liberty bonds or pay the interest on a Liberty Loan of $5,000,000,000.

Metal Frames and Wire Glass

Commissioner Young, of North Carolina recently sent out to building inspectors and fire chiefs of the State a circular in regard to the protection afforded by fire shutters and the advantage of having this protection of metal frames and wire glass, and this matter merits their earnest attention.

Under the State law all openings in the rear and sides of buildings in the fire district must be protected by fire shutters or metal frames and wire glass. The metal frames and wire glass cost very little, if anything, more, and are decidedly superior to the regular fire shutters, as they do not get out of order, do not wear out or become dilapidated so rapidly, and are always in condition to protect the property. Officers should bring this matter clearly to the attention of the citizens of their cities and see that these openings are promptly protected.

Specifications for the proper roofing of flat surfaces with slate are given in a newly issued booklet by the Vendor Slate Co. Inc., Bangor, Pa.

Dating from April 1st, the Youngstown, Ohio, office of the H. W. Johns-Manville Company, is located at 520 Market Street.

Prevents Infiltration of Air

To prevent the filteration of air into boilers through porous brick-setting, and thereby save fuel-loss, the Barrett Company, of New York City, has prepared an admirable material called "Nox-Aer-Leek." The product "is a plastic cement composed of elastic bitumen fused with non-drying oils and asbestos fiber. It is troweled on to the exterior walls of the boiler-setting and makes the setting air-tight and moisture-proof. It adheres firmly to the brick and will not dry out or become hard and brittle. Instead, it remains permanently elastic, contracting and expanding with the walls.

"Not only will NOX-AER-LEEK render an old or new setting air-tight, but it prevents a new setting from developing crevices, because the brick and mortar cannot absorb and repel moisture, which action tends to break down the mortar.

"NOX-AER-LEEK is for use on exterior walls only."

INDUSTRIAL HOUSING

Industrial home building continues to engage the attention of Federal Government officials, manufacturers and members of the building fraternity, and the question promises to keep well to the fore for a long time to come. Indeed it is not an exaggeration to assert that industrial conditions in this country are undergoing a radical change, and that the housing of the workers is one of the most important phases of the general problem.

Labor employers now appreciate that if they are to secure the maximum of efficiency from their help, the latter must be housed in attractive, sanitary and fire-safe homes, instead of the ramshackle type of structures in which many of them have been herded in times past.

Only through the use of masonry can a type of industrial home be secured that will combine all the essential elements desirable in such form of building, a fact that is being appreciated in ever increasing degree by the large labor employers of the land.

To meet the widespread demand for information upon industrial homes, the National Fire Proofing Company of Pittsburgh, has issued two illuminating booklets upon the subject; the one titled: "Industrial Housing" and the other: "Natco Homes for Workingmen."

These booklets present elevation and floor sketches of low price houses, together with their approximate cost. A fine example of Natco houses for workingmen is supplied by those recently erected at Sparrows Point, Md., for employees of the Bethlehem Steel Company. These are described in the company's literature as follows:

"Four cottage-rows, 30 ft. x 250 ft., 10 apartments each, 6 rooms, stair hall, bath; thirty double houses, 30 ft. x 44 ft., 6 rooms, stair hall, bath. First and second floor plan as shown in both types; all have cemented cellars and hot air furnaces.

"Ten rows (shacks) 14 ft. x 140 ft., 10 one-room apartments each, 4 men to apartment, double-deck iron cots, cement floors and plastered walls, enameled iron washbowl, and stove in each apartment. Cook-house provided nearby.

"All of these living apartments have hot and cold water, electric light, fireproof division walls, slate or asbestos-shingle roofs."

Some of the reasons advanced for the use of hollow tile are as follows:

"First—Natco is made of hard burned clay—fireproof and everlasting.

"Second—The units lay up rapidly in a wall, thus assuring a great saving in time and labor.

"Third—Natco is cheaper than any other form of masonry construction.

"Fourth—While Natco costs a little more than frame construction, it proves the cheapest in the long run because of the saving in painting and repairs.

"Fifth—Laid up on end, it provides a bearing wall of maximum strength with a minimum of weight.

"Sixth—The enclosed air spaces in the hollow tile walls insure an insulation that is impervious to moisture and highly resistive to temperature changes.

"Seventh—A Natco wall cannot be penetrated by rats or vermin."

The United States Gypsum Company, of Chicago, has issued a new catalogue describing and illustrating its roofing product.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912, of CONSTRUCTION, published monthly, at New York, N. Y., for April 1, 1918.

State of New York,
County of New York, ss.

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared G. A. Watson, who, having been duly sworn according to law, deposes and says that he is the Editor, of the "CONSTRUCTION," and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, CONSTRUCTION PUBLISHING CO., INC., 120 Liberty St., New York.

Editor, G. A. Watson, 120 Liberty St., New York.

Managing Editor, none.

Business Manager, G. H. Stewart, 120 Liberty St., New York.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock.)

George A. Watson, Cranford, N. J.

Louise C. Watson, Cranford, N. J.

G. H. Stewart, 120 Liberty St., New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

G. A. WATSON, Editor.

Sworn to and subscribed before me this 1st day of April, 1918.

HARRY H. CORNWALL.

(My commission expires March 30, 1919.)
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Certificate Filed N. Y. Co. No. 21.

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The Average Man's Home

Practical Homes

ARCHITECTS, real-estate dealers, and prospective home builders will find the above plan books of pronounced help in selecting designs for houses to cost from $3,000 to $5,000 each. The plans were prepared by architects in all parts of the country, with the primary thought of designing houses that are at once attractive, convenient and economical as to cost of construction.

The price of either book is $1.00 per copy. Both can be had for $1.50; or either will be given as a premium to a year's subscription to CONSTRUCTION—the only National Firesafe Building publication in existence. A regular feature of CONSTRUCTION is its Safe Homes' Department, containing illustrations and plans for homes of fire safe types, designed for use of the man of modest means.

To take advantage of the combination offer fill out and mail us the blank printed herewith.

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ORGANIZED 1853

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consistent presentation—in season and out—of your product in CONSTRVCTION cannot fail to result favorably because the success of this publication depends upon

(1) how well it advances and proves the argument for proper fireproofing

and

(2) what it actually accomplishes to increase the use of firesafe materials and devices.

The first objective is attained (intensively) through the editorial, news and advertising sections of CONSTRVCTION and (extensively) by sending the magazine over the entire country to all the business and professional interests related to building, planning, construction, equipment and maintenance.

The second purpose is accomplished by **actively fighting for legislation favoring firesafe construction** and against laws permitting the continued use of wood—and remember that no company can do this work as effectively as a publication, that the "fireproofing fraternity" at present is a composite unorganized body comprising a number of separate units representing more than a dozen industries, that there is practical need of a national mouthpiece such as you have in CONSTRVCTION, that **makers of fireproof materials are now getting but one per cent. of the business which ought to be theirs,** that advertising in CONSTRVCTION is helping yourself to get more orders, giving your goods the representation they deserve—and according this publication the cooperation it merits.

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Reynolds Shingles have a top surfacing of granulated slate, granite, etc., and they positively will not ignite from flying sparks or brands. Where fire originates inside the building they have a marked blanketing influence.

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Reynolds Shingles are the standard asphalt Shingles and you will make no mistake in insisting on Reynolds Shingles.

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ROOFING MATERIAL
CLASS C
ISSUE No. 118

If your dealer cannot supply you write the factory.

H. M. Reynolds Shingle Co.
"Originators of the Asphalt Shingle"
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CONSTRVCTION

ADVOCATING THE CONSISTENT VSE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

George A. Watson, Editor — Ralph P. Stoddard, Associate Editor
Bruce E. Loomis, Ins. Eng. Editor — Wm. Wallace Ewing, Consulting Eng.
George H. Stewart, Business Manager

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120 LIBERTY STREET
New York, N. Y.
L. C. Watson, Sec.-Treas.

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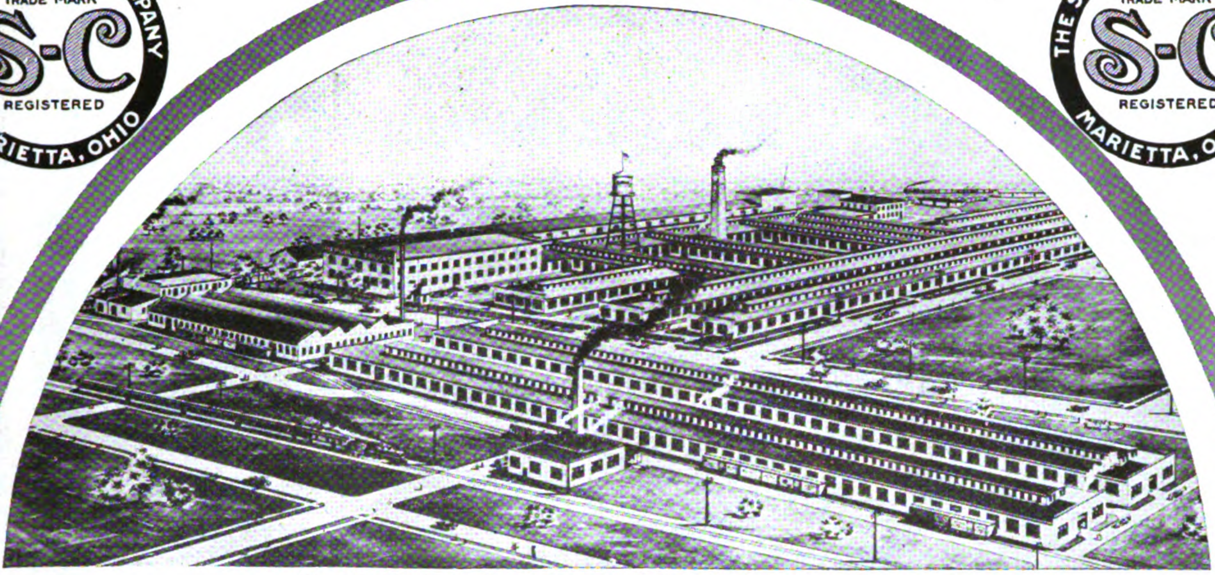

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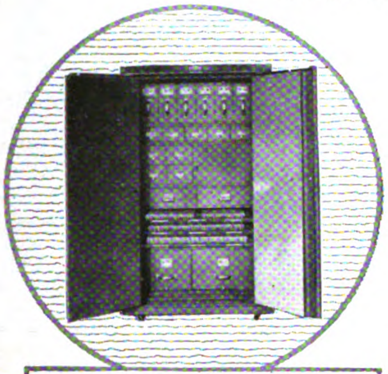

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Fire and Water Resistant

The above reproduction graphically illustrates the fire-resisting qualities of

Ambler Asbestos Corrugated Roofing and Siding

It shows part of a large industrial plant destroyed by fire and an adjoining building covered with Ambler Asbestos Corrugated sheathing which was unharmed by the flames. In this instance as in many others, our Corrugated Roofing and Siding proved to be better than an insurance policy.

Besides being fireproof it is sufficiently elastic to allow of marked tension due to vibration, expansion and contraction of surrounding parts, wind pressure, etc., without cracking or breaking in any manner. Once put on, it stays on as long as the building stands, and it never needs painting or repairs, the first cost is the only cost entailed.

The Ideal Skylight

We have manufactured exclusively for us a Corrugated wire Glass to be used for skylights in conjunction with Ambler Asbestos Corrugated Roofing. It makes a non-leakable fireproof skylight. Easily put into place and is much more economical than other types of skylights.

A word from you will bring the whole story—prices, pictures and samples.

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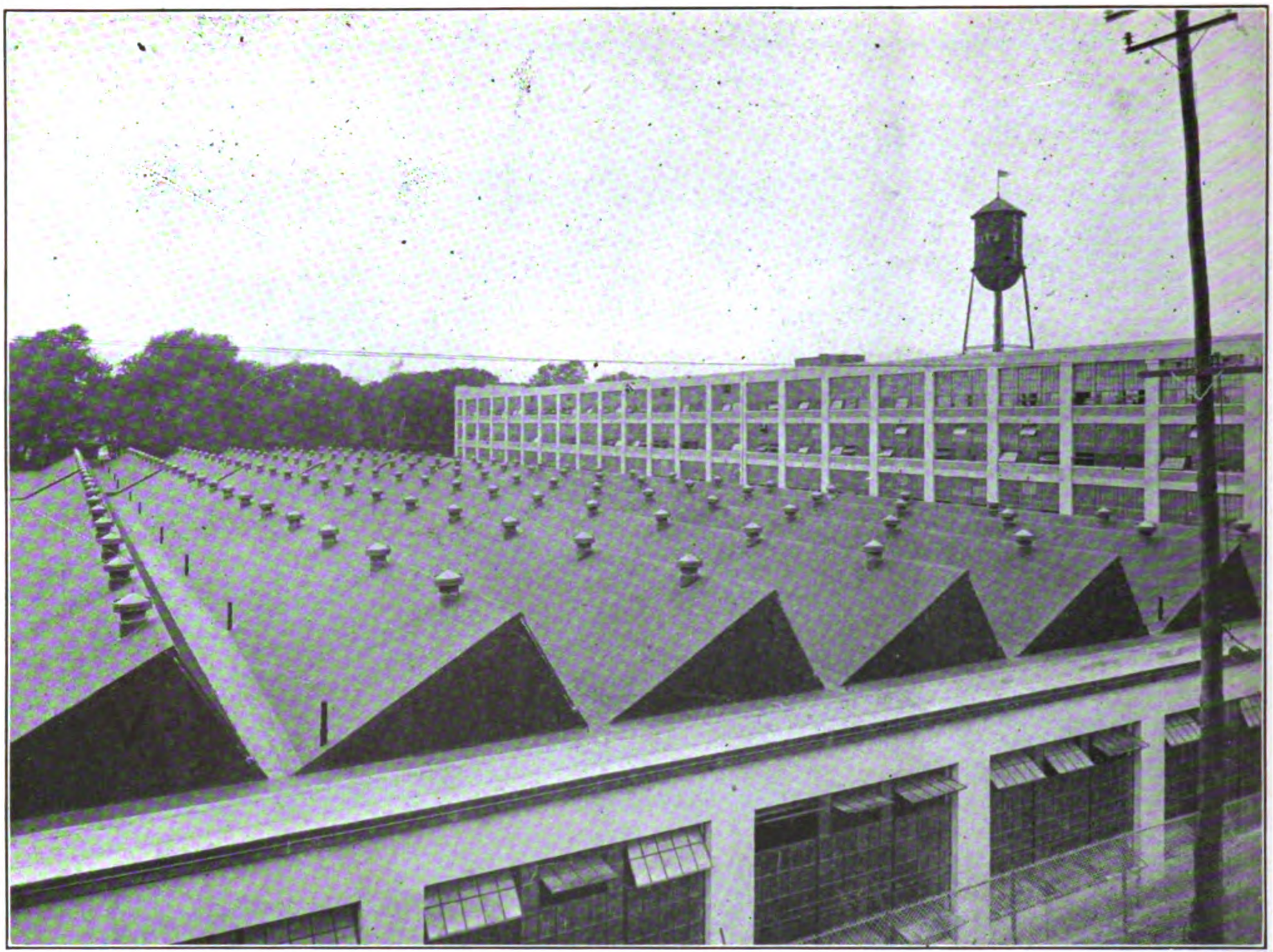
Manufacturers of Ambler Asbestos Shingles, Asbestos Corrugated Roofing and Siding, 85% Magnesia Pipe and Boiler Covering, and Asbestos Building Lumber



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CONSTRVCTION

ADVOCATING THE CONSISTENT VSE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

Vol. VI MAY, 1918 No. 5

Meeting of National Fire Protection Association

ATTENDANCE at the 22nd annual meeting of the National Fire Protection Association, at Chicago early in the present month, was fully up to that of former gatherings, a fact that speaks well for the men belonging to the organization and the highly valuable service it is rendering the cause of fire safety.

A number of papers upon subjects of high concern to the building and associated interests were presented, and discussed at the several sessions. Extended consideration was given the matter of industrial home building, and a series of standard regulations for such construction prepared.

Upon succeeding pages of CONSTRUCTION will be found some of the noteworthy papers presented at the convention.

As officers of the Association for the new year the following named were chosen:

President, F. T. Stewart, New York; 1st vice-president, H. O. Lacount, Boston; 2d vice-president, W. E. Mallalieu, New York; secretary-treasurer, Franklin H. Wentworth, Boston; chairman of executive committee, H. L. Phillips, Hartford. Executive committee (for three years): Gorham Dana, Boston; H. W. Forster, Philadelphia; Rudolph P. Miller, New York; H. L. Phillips, Hartford; A. R. Small, Chicago; John B. Laidlaw, Toronto (for one year). Nominating committee (1919), three members: R. H. Newbern, Philadelphia; Frank D. Chase, Chicago; C. Heller, San Francisco.

Roofing Industrial Homes

IN its advertising literature the Keasbey and Matteson Company emphasizes the importance of covering the industrial houses now being erected in such number in all parts of the country, with incombustible roofings. It contends that "owing to the 'speeding up' process the danger from fires correspondingly increases." If the thousands of new houses built are not fireproof there is not only danger of a conflagration, but there is also a constant menace to the industrial plants themselves. A spark from a locomotive, for instance, may ignite the roof of a house and thereby jeopardize the entire community.

The danger from wood shingle roofing cannot be emphasized too strongly, particularly where, as in the case of large industrial groupings, houses are near one another and afford a ready track along which the flying fire brand could travel.

In these days of unlimited quantities of masonry material, no proper reason exists for the building of frame structures; but if through mistaken ideas of economy or time-saving such are erected, by all means let them have roofs of a fire-resisting type.

Federating the Building Industry

Holding that the time had arrived when the "whole building industry of the United States should be federated," in order that the Government may have the most intelligent support and powerful co-operation of all the interests involved, the American Institute of Architects has taken steps to bring about such organization.

Addressing members of the building fraternity under recent date the American Institute of Architects said in part:

"The war-time need of such action appears to be immediately imperative and it would seem that the first and paramount duty of the building industry is to place its knowledge, skill, and equipment unreservedly at the service of the nation, involving as it does elements and factors of the widest diversification. That service can only reach its maximum of efficiency through intelligent adjustment of all the vital parts. The building industry also owes it to itself seriously to study from the broadest possible viewpoint the inevitable disorganizing influences of war which have already been felt, and through such study to determine what steps can be taken toward bettering conditions and minimizing any further unnecessary disorganization.

"With a view to the possible formation of a national organization, which might assume the burden of this tremendous undertaking, the American Institute of Architects accepts the patriotic duty of initiating the movement. To this task the whole building industry should subscribe. As a first step the Institute invites you to send a duly authorized and accredited representative to a conference to be held at the Engineering Societies Building, 25 West 39th Street, New York City, beginning at 10 A. M. on June 14th, 1918, for the purpose of discussing the situation and determining the method and providing the means whereby such an organization may be created. This invitation is being issued to national and important local organizations, which represent the building industry—whether technical, manufacturing, contracting or labor.

We will greatly appreciate your prompt notification of acceptance of this invitation, and at the earliest possible moment the receipt of the name of the representative whom you will send.

"Please address all communications to the Executive Secretary, the American Institute of Architects, The Octagon, Washington, D. C."

In view of the high importance of the work undertaken, it is hoped that attendance at the preliminary conference on the 14th prox. will be both large and thoroughly representative. Great good should result from a frank discussion of the building situation and the relation thereto of the Federal Government, which just now is in need of all the aid intelligently directed effort can render.

Better Construction Upon the Farms

ISOLATED as they are for the most part, farm buildings are beyond protection in case of fire, and hence should be erected of masonry material. Appreciating this fact, L. S. Hussey, State Fire Marshal of Kansas, addressing the farmers in his commonwealth, said in part:

"Better construction would add greatly to the safety of farm property from both wind and fire. The trouble with many farm homes is that they are lightly constructed of combustible materials. The increased use of concrete, brick and stone will tend materially to reduce the fire hazard and the fire loss on the farm and in the small town.

"In the matter of construction particular attention should be given to the chimney. All chimneys should be substantially built and should be laid on a solid foundation. They should begin at the ground and extend upward well above the peak of the roof. No timbers should be allowed to rest upon any part of the chimney."

World's Largest Building

WORK will soon be started in South Brooklyn, N. Y., on what the contractors say will be the biggest building in the world. It will be the warehouse for the new army supply base for overseas transportation between Second Avenue and the pierhead line from Fifty-eighth to Sixty-fifth Streets.

Contracts for construction awarded by the War Department to the Turner Construction Company, of New York City call for the expenditure of $40,000,000 for the warehouse and three double deck, concrete, wood and steel piers.

Cass Gilbert, architect, prepared the plans under the direction of Major-Gen. Goethals, director of storage, transportation and purchase of the quartermaster department, U. S. A.

The plans call for 6,000,000 square feet of fireproof floor space under one roof, the building to be approximately 1,000 feet square and from eight to nine stories high.

The three double-deck piers are to be 1,300 feet long and 150 feet wide. A one-story lighterage pier, 1,350 feet long and seventy-five wide, is also to be built. These piers will be longer than any pier in New York harbor at present and will accommodate any vessel afloat.

It will require 150 elevators to handle the 1,000,000 tons of goods to be stored in the warehouse. Approximately thirteen miles of railroad track will be installed to serve the entire supply base.

An idea of the magnitude of the enterprise may be found in the fact that the warehouse will have five times the floor area of the Equitable Building and seven times the cubical content of the Equitable Building. The main warehouse will cover a space equal to the entire ground occupied by the Museum of Natural History at Central Park and Eighty-first Street.

The Turner Construction Company expects to have the building ready for partial use by the end of this year and the entire plant will be completed by the spring of 1919.

Denver's Civic Center

Denver acquired for a civic center nine acres of valuable ground in the heart of the city, opposite the capitol buildings, nearly a decade ago. Upon the proper beautification of the tract, experts have differed; and the result has been that the tract was not consistently improved. Work begun last year under Mayor Speer, however, is expected to be finished before the close of 1918, and to leave the center complete. It will contain an open-air Greek theatre seating 5,000 people, partly done in marble and granite. There are to be gardens, lagoons, statuary and balustrades, the whole costing over $2,000,000 in addition to donations from citizens.—"Stone."

The Public Service of the Fire Underwriter in War Time

By W. E. Mallalieu

THE nation's call to war-time service has met with such hearty response on the part of most professions and lines of business, that the underwriters do not wish to claim any disproportionate credit for themselves. They have constituted but one of the many channels through which our national spirit has expressed itself. Yet, they have had their own peculiar part to play, and a brief summary of events that to us have been epoch-making seems now to be in order.

On March 21, 1917, it required no especial gift of prophecy to see that the United States was about to find itself at war. Many people and many institutions were suddenly looking the situation in the face as a personal matter, and were asking themselves the question. "What part must I play?" In all this multitude the National Board of Fire Underwriters felt that there rested upon it the burden of a peculiar responsibility, although the thought presented itself less as a burden than as one of opportunity for service.

It need hardly be said today that the United States, with its long traditions of peace, was at that time almost entirely unprepared for its part in the struggle. Our vast industrial resources were a mere collection of units and not the single organized machine toward which they are now evolving. The three immediate problems were man power, finance and supplies.

Securing supplies was by no means the least of these; it must be based upon the most minute knowledge of sources of supply, and the huge task of investigating and classifying such sources in a nation as large as the United States would naturally involve months of delay in the placing of orders. Every day was precious. A short cut was imperative. Fortunately there chanced to be one widely organized business which was already possessed of this information. The fire insurance companies operate in every section of every State. They have relations with almost every owner of property, and these relations necessitate the acquirement of exact knowledge concerning the property to be insured.

Priceless Data

The National Board was in position to organize this priceless data and make it available for the nation's needs. Perhaps we may be entitled to a little credit for the fact that this conclusion was reached and these resources were tendered to the Government by purely voluntary action upon the date already mentioned, sixteen days before the declaration of war. Needless to say, acceptance was prompt and cordial; the officials were more than eager. Work was got under way with such speed that the names of hundreds of factories fitted to produce munitions were placed in the hands of the Government within the few days intervening before Congress voted war.

There is no need to enlarge upon the detail by which these results were made possible. Most big undertakings require systematizing upon a large scale, but a rather interesting psychological effect was produced in our own offices. It was almost as though someone had pulled a lever and thrown the clutch into a new set of gears. We had all of us been working hard and steadily upon our familiar tasks. We believed our work to be of great importance to the public, and knew that we were giving it our utmost endeavors, when, suddenly, there appeared this new task, so imperative as to require the absolute right-of-way. Many other things, therefore, stopped with something of a jolt, while a hastily improvised force, drawn from other activities, commenced to aid the nation in its direct preparations for battle. We began to wonder whether we were really insurance people, after all.

After More Than a Year

In retrospect now, after more than a year, we can see that this was only the beginning, although it loomed large at the time. It was, in fact, no small affair, for in the few months which followed, we supplied to the Government complete data upon more than 13,000 separate manufacturing plants, each one able to fit into the vital scheme of war-time supplies. We know that the United States placed orders quickly with many of these plants. May we not, therefore, believe that our efforts contributed toward giving the nation a more advanced place in the war work than would have been possible without them?

Very closely upon the heels of this information service came another of hardly less importance. In a sense, it was somewhat analogous to the health work among the troops. In this war, as never before, it is realized that it is not sufficient to have mere numbers of men in the armies. These men must be kept as "effectives." A man on his back in a hospital is a liability not an asset—wherefore there have come about the provisions for gas masks, anti-typhus vaccine, and other protective measures calculated to keep the soldier fit for fighting.

The fire insurance interests felt that they could assist in keeping the American factories fit for fighting, through acting upon the modern theory that an ounce of prevention is worth a pound of cure. A very common factory disease is that of fire. It is all too prevalent in every year, but under war-time conditions it began to resemble an epidemic. Naturally, the newspapers and the public assumed that these numerous industrial fires were largely chargeable to "German spies." Investigations made by the National Board of Fire Underwriters, through its Committee on Arson and its Actuarial Bureau, have largely disproved this idea, and have thrown increased emphasis upon the fact that abnormal conditions of production, in themselves, have caused a great increase in fire hazard.

When this fact was made public, it proved a sad disappointment to many who were expecting the more sensational explanation. They were something like the Irishman who said to his small son, "Mickey, sthop makin' thot noise." Mickey answered, "I'm not makin' any noise, fayther," and the father said, "Well, make some thin; don't be sthandin' there quiet, makin' your fayther out a loiar."

American Carelessness

The ardent zeal of many of our patriots would almost have welcomed the evidence that German spies with torches were effecting great destruction. It was somewhat disconcerting to have the responsibility traced to Germany's chief ally on this side of the ocean—good old American Carelessness. In this case, however, there was a natural explanation, although not an excuse.

So great was the concentration of thought upon the subject of production that conservation was temporarily overlooked and, as a consequence, these highly speeded factories, grain elevators, and the like, began to burn with even more than their usual frequency.

Please do not understand that I am underestimating the incendiary ambitions of the spy animal in this country, nor deprecating the need for vigilance. Far from it! His evil intent has been shown in many ways, and if he has met with less success in the matter of fires than he doubtless hoped for, this fact, in itself, is attributable to the value of vigilance.

But, oh, if people would only learn to exercise similar vigilance against themselves! If they could only appreciate the amazing degree to which their own carelessness gives aid and comfort to the enemy! Perhaps it would help them, could they visualize this carelessness in the form of an enemy alien, with their own features changed into Teutonic mold, with spiked helmets upon their own heads, with flaming torches in their own right hands, and iron crosses pinned upon their own breasts. If they could see this true picture of their carelessness personified, it might shock them into reform.

The National Board felt that the industrial fire loss menace had become acute; it undertook to see what could be done toward keeping America's supply plants in the industrial trenches. In co-operation with the Council of National Defense, with other fire insurance organizations, and with many local and State officials, it organized and directed a nation wide campaign, employing the services of some 3,500 inspectors and surveyors, operating under various State executive committees. In some States these inspectors were given an official standing by commissions from the Government.

Tens of Thousands of Inspections

Within the next few months there were literally tens of thousands of American factories, grain elevators, flour mills, warehouses, cotton compresses, saw mills, fertilizer works, piers and similar premises individually inspected by men who had received special training in the detection and correction of fire hazards. These men received their salaries from the fire insurance companies, but they were definitely instructed, while engaged in this task, to "forget that they were insurance men," and remember only that they were performing a public service in conserving the national resources.

It is a trifle difficult to appraise the exact results of this work, although we endeavored to indicate some of its bearings a few months ago, in a bulletin entitled "The Fires That Did Not Occur." Certain it is that industrial fires have by no means been eliminated, but it is equally certain that in countless instances, the visit of the inspector has been followed by prompt correction of the hazards discovered by him. We firmly believe that innumerable factories, grain elevators, and other points of production or storage, are now in the nation's industrial trenches instead of its hospitals or graveyards, because of the work done in this campaign.

Section of War Industries Board

This work has now been given a permanent official standing by the Federal Government through the establishment of a Fire Prevention Section of the War Industries Board, operating directly from its offices in Washington. There has been some misunderstanding of the exact function of this new section. It is not intended in any way to disturb existing agencies where the inspection work that they are doing is satisfactory. In fact, the efforts of the section will be directed principally toward improving conditions in certain privately owned plants where munitions needed by the Government are being produced under unnecessarily hazardous conditions. There are perhaps from one to two hundred of these plants, and war-time needs demand that they be safeguarded as swiftly and completely as possible.

All organizations and individuals interested in the subject of fire protection are urged to co-operate by reporting upon any plants of which they may happen to know. The whole subject of safeguarding our sources of supply in this highly industrialized war is so vast that the combined efforts of all who may contribute will still fall short of complete protection. It is a field of patriotic service which cannot be overcrowded.

Almost simultaneously with the creation of this section there came another development of unusual interest. This was nothing less than the establishment of a Fire Prevention Bureau of the National Board of Fire Underwriters, in the War Department at Washington, by the order of the Acting Secretary of War, Benedict Crowell. The purpose of this Bureau is to co-operate with the War Department in all matters concerning fire prevention and protection, so far as they relate to the construction and leasing of buildings.

It is somewhat difficult to combine justice to my subject, with consideration for my hearers. I have been asked to cover the national service work of our organization, but realize that there are also other speakers who have a claim upon your time. Details, therefore, must be ruthlessly lopped off in giving the merest glimpse of some of the other forms of activity.

Take, for example, our work at the army cantonments.

Have you visited one of these cantonments? If so flash it before your eyes in a mental picture, since it represents one of the most interesting experiments in construction ever undertaken.

Your mental picture will show you a far stretching wooden city of the hastiest possible erection. We have just been talking about the necessity for keeping our factories in the trenches, by safeguarding them from fire. Well, one of these cantonments is to be regarded less as a city than as a factory, an army factory. It receives its raw material, and some of it is pretty raw, and it turns out a splendid product in the form of those khaki-clad battalions of which we are all so proud.

The Wooden Factories of Armies

Can you imagine what a conflagration would do to such a great wooden factory of armies? Probably you never stopped to think about it, but I assure you it was one of the first things of which we thought when the Government's encampment proposition was made known. Some of our people believed that in spite of all precedent, these apparently tinder box cities could be made virtually conflagration proof. The War Department invited us to try our hand at it. Therefore, while the camp sites were yet uncleared, there began the preparation of the plans for construction. National Board engineers, drafted from our Committee on Fire Prevention, were given offices with the Construction Division of the Quartermaster's Department in Washington, and their ideas were incorporated with these plans while yet on paper. The results speak for themselves.

Each encampment has an adequate water system. Each one is equipped with a fire-fighting force and apparatus, operating from conveniently disposed fire houses. The alarm system is complete; heating and lighting installation is of an approved type. All of the buildings contain fire buckets, extinguishers, etc. They are sufficiently separated to reduce exposure, and are covered with fire-resistive roofing. Safety rules have been worked out, regular inspections organized, and, in short, there has been undertaken all that foresight could suggest in the way of eliminating an almost overwhelming natural fire hazard.

Perhaps it would be wise to wait until the end of the war before boasting of results, but at least it may be said that the fire loss upon approximately $100,000,000 of construction was only $2,150 up to the time that the camps were turned over to the commanding generals. Without considering the unusual hazards of construction, such a low fire loss is probably unprecedented.

Never before has it been possible to try a fire-prevention constructional experiment upon such a huge scale. Never have results been obtained that were more illuminating. I might add that the actual carrying out of the plans occurred under the eyes of other members of our engineering force, one of whom was assigned to each cantonment during the process of erection.

Engineering, Investigation, Education

There is not time for more than a cataloging of the rest of our national service activities. They have come under three general heads: engineering, investigating and educational. Under each of these heads there has been effort to do work that was definitely constructive. National Board engineers have injected fire prevention provisions into the huge plans of the Emergency Fleet Corporation, and the Bureau of Yards and Docks of the Navy Department have made inspections of ship yards, of marine and aviation encampments. They have inspected Government buildings in Washington, where the emergency of the hour has led to various improvised office arrangements, and where serious interruption of war activities would be caused by fire. Several of our own officials have been compelled to make such frequent trips to the national capital that they have come to feel almost like commuters.

Reference has already been made to investigations conducted by the Committee on Incendiarism and Arson. Where fires have involved the suspicion of enemy plots, this committee has been working in close co-operation with the Department of Justice and some of the other Government departments. Details of its operation are necessarily confidential, but it can be appreciated that the activity has been very great since the beginning of the war.

Co-operation by the Press

Our educational work, on the other hand, has courted the widest publicity, and the American press, recognizing its genuinely public service character, has cooperated without stint. Probably many of you are already familiar with our "Safeguarding" series of fire-prevention booklets. The first of these, "Safeguarding Industry," was prepared to give practical instruction to managers of plants in reducing fire hazard. It was issued for the Council of National Defense, and 125,000 copies were sent to important manufacturers in all parts of the country. At our request, President Wilson gave us, for use upon its cover, a signed statement that has now become famous, the one which begins, "Preventable fire is more than a private misfortune—it is a public dereliction." When these booklets were sent out, they were accompanied by an illustrated poster of specific warnings to factory hands, and also by self-inspection blanks.

Our second booklet, "Safeguarding Grain," was issued for the Food Administration, and bore a signed statement from Mr. Hoover. It went to all of the important shippers and handlers of grain in the United States, and is now commonly known throughout the West as Hoover's rules. A similar purpose among cotton compresses, warehouses, etc., was fulfilled by our booklet on "Safeguarding Cotton," for which Secretary of War Baker issued a statement.

Latest, and perhaps most important in the series, is our fire prevention manual for use in schools, which bears the title of "Safeguarding the Home Against Fire." We have produced this booklet for the United States Bureau of Education, with a signed statement, and also a special preface by Dr. Claxton, United States Commissioner of Education, and he is recommending it to the schools of the country for use in the first half of the seventh grade work as a standard text book.

These are but a few of the many pieces of fire prevention literature which the National Board has produced within the past year, and all have been directed against the citadel of American carelessness in which so many of our destructive forces find their stronghold.

The German Mind

A speaker recently said that if one would understand "the difference between the German mind and the human mind" it was necessary to consider the process of instruction by which the present generation of Germans has been psychologically created for war purposes. The world would be fundamentally out of joint if such an evil instance were to remain as our chief example of the educational possibilities of persistent propaganda. If systematic efforts, wisely planned, and patiently employed, might have an ultimate effect in altering the consciousness of the American people with respect to their great weakness of habitual carelessness, its effect would be by no means limited to the single matter of fire waste. Its value would be seen in countless desirable ways.

We firmly believe this feasible. We do not expect the impossibly sudden, but we do know that underlying the carelessness and optimism of our fellow countrymen there is a solid substratum of common sense. If we will but plant our foundations deep enough a permanent structure can be erected. That structure, the America of the future, should not be left to form itself in the old haphazard way. With vision enlarged and minds made serious by the tremendous lessons of humanity's great struggle, may we not gain a truer conception of our responsibility in leaving a heritage of reconstructed national character to the generations which are to come?

A New America

May we not contribute toward the formation of a new America, not less happy, and more reasonably and surely optimistic, but one in which carelessness and the light-hearted willingness to "take a chance" shall have been replaced by conservation, efficiency and far-sighted preparation for desired development?

If the National Fire Protection Association and the National Board of Fire Underwriters and all other great voluntary organizations can conceive of their present activities in the light of these ultimate effects, a great step will have been taken toward merging the present with the future.

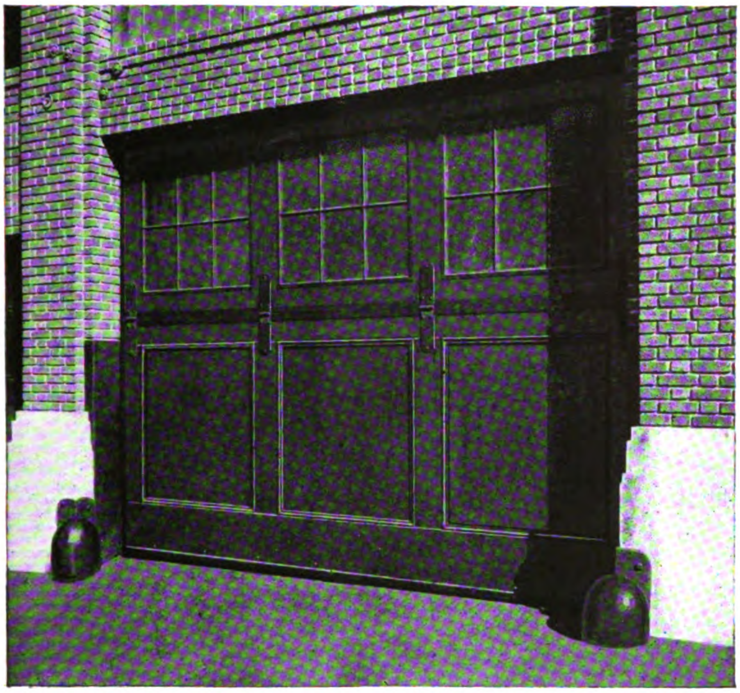
Favor Use of Hollow Tile

HOLLOW tile is to be used in the construction of many of the buildings to be erected in Washington, D. C., for the accommodation of Government workers. Experience has convinced the authorities that aside from its fire resistiveness and other advantages over wood, hollow tile can be used as rapidly as lumber in construction work and costs but little more.

Seeking Smaller Business

IN the absence of large building operations many supply dealers are sensibly cultivating small repair business, appreciating that while each individual order means but little, it is the aggregate that counts. Because of the small investment needed to make repairs or extensions compared with the erection of entire structures, it is easy to interest property-owners in small work just now, and wide-awake builders and building supply men are conducting an active canvass in such direction.

Widely Used Elevator Doors



WE have just received a copy of "Peelle Products," the latest catalogue of the Peelle Company, makers of fireproof freight elevator doors: best known perhaps through their counterbalance doors. This book, while devoted to the products of one firm, contains such valuable information about fireproof doors as to make it distinctly worth while. We are advised that copies will be sent to those desiring them upon application to The Peelle Company, Stewart Avenue and Harrison Place, Brooklyn, New York.

On this page are shown several types of doors made by this firm; they are the result of years of specialization in this kind of work. The problem has been to render fireproof doors, which are necessarily of heavy construction, easy and certain of operation. It has been solved so successfully that Peelle doors are generally known as the safest, best and most efficient freight elevator opening protectors on the market.

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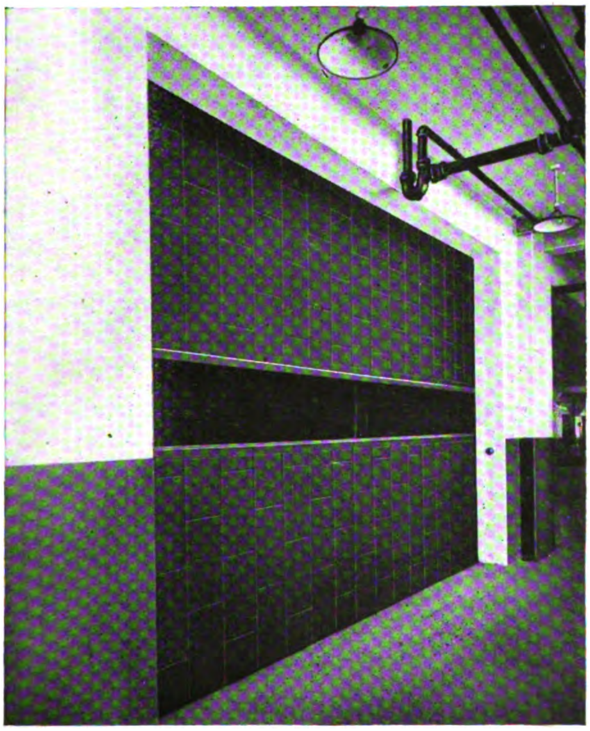

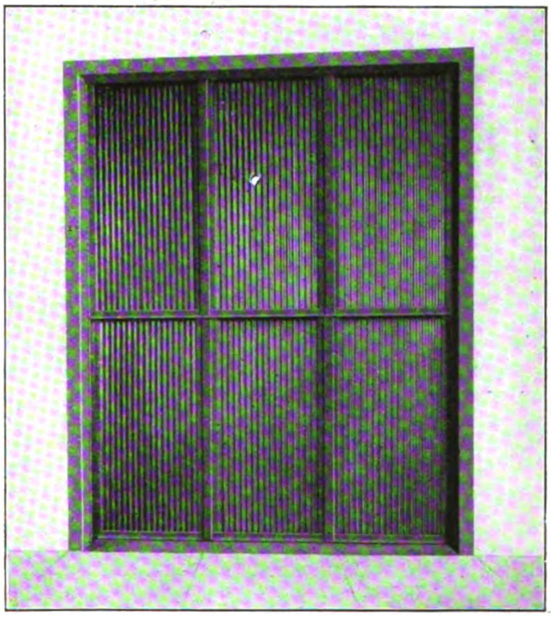

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Building War Hospitals of Concrete

THE numerous fires which, according to newspaper reports, have occurred in the various cantonments throughout the country, have shown conclusively the fallacy of the principle of constructing all buildings, especially warehouses and hospitals, of wood. This seems to mark with special emphasis the folly of erecting the large receiving and similar hospitals in any other manner than through the medium of a construction that is, if nothing else, fire resisting; especially so where such hospitals are in thickly populated localities, and, therefore, subject to the acts of incendiarism that are apparently so prevalent throughout the country.

It has been one of the claims of the officials of the War Department, according to the Corn Exchange, that speed was the requisite feature, and that speed only could be obtained by the use of wooden construction, and that of the flimsiest and most destructible type. Experience has proven that these officials were not justified in this claim.

Stucco construction, when built up with high grade cement mortar has time and again proven its effectiveness in the prevention of a spread of fire; offers a possibility of insulation against cold and heat that cannot be obtained through the medium of wooden walls, and where buildings, such as the proposed hospital, are projected, can introduce an additional type of labor that will diversify the operations and will therefore introduce a greater speed.

These statements are especially applicable to the hospital at Staten Island, in view of the marked freight congestion now existing in and around New York harbor. Buildings of this type, entirely of lumber, would require thousands of feet of lumber, which means the additional stagnation of the traffic conditions, whereas by taking advantage of the opportunities of stucco construction, a wooden frame can be erected which will mean only sufficient lumber for this portion of the building or a reduction of the quantity handled by considerably more than half. Sand and cement are always available without rail transportation.

Permits of Work in Winter

It has been offered as a further objection to this type of construction that it is impossible to do this work during the winter. This objection does not seem to be valid, as hundreds of experiences throughout the country prove the contrary. Immediately after the uprights of the buildings are erected, the carpenters will be followed quickly by other mechanics covering the timber frames with a tar-paper and metal reinforcement. If then, the temperature should be very low, this tar-paper provides ample covering to insure the completion of the interior of the buildings, or its temporary occupancy if this should be essential.

Under normal water temperatures (plus 15 up to freezing point) if ample consideration is given to heating the materials, which would involve comparatively little additional expense, there should be no hesitancy in considering the use of stucco construction especially when applied by a machine known as the "Cement Gun" which mixes the water with the cement coincidentally with the placing on the wall. It is a well known fact that hot water provides rapid crystallization of cement particles, and with this method, an almost instantaneous set is assured which will prevent freezing.

Britain Favors Safe Construction

In England, where the greatest consideration has been paid to the protection of the lives and living conditions of not only the men and families who are engaged in war industries, but especially the care and comfort of those men who have so valiantly offered their lives as a sacrifice for the country, consideration has been given only to the structure which would provide safety in the highest degree.

Inasmuch as our light and information on the various war conditions has emanated in a large degree from the experiences of both England and France, and since the experiences of thinking and practical men throughout this country, as a whole, have justified the construction only of structures that offer a greater degree of permanence than wooden structures, it is hard to realize that our medical and Red Cross organizations have not risen in rebellion against such a decision as that shown in the Staten Island contract. With all the criticism which has been directed against Secretary Baker, in justice to him, it can be said that these criticisms could not be of a character to show that when mistakes were brought to his attention, he did not try to correct them.

It would, therefore, seem, in justice to him, this statement of facts should demand his personal investigation, for without question the parents of this country will rise in open rebellion should a holocaust, such as is easily possible with the structures as now proposed by those in authority, ever occur.—The Corn Exchange.

Help Win the War by Erecting Unburnable Buildings

Uncle Sam's $100,000,000 Lamp for Workmen Alladins

By G. G. WHEAT, in the "Boston Evening Transcript"

"UNDER the present conditions of house shortage and congestion in the United States, the building of homes for workmen becomes a governmental function, and should be treated as a pure war emergency, and at the present moment the most necessary thing to be done to win the war * * * every day's delay is fraught with the utmost danger."—From the resolution of the board of directors of the Chamber of Commerce of the United States, adopted Dec. 14, 1917.

Ships and food. Food and ships. Ships, ships, and more ships, has been the slogan above all others to win the war with. America's mind is made up that we must build ships to carry armies and food and munitions across and build destroyers to kill U-boats.

Housing or the lack of it has proved to be so important a factor in the building of ships that Congress has voted $50,000,000 to house ship workers. A bill for another $50,000,000 is now in Congress for housing all other war munition workers, including those building naval vessels.

Coming to Quincy

The city of Quincy probably has as big a housing problem as any other shipbuilding point. This question has aroused a tremendous amount of attention and has been given careful study by many agencies here in Boston. The housing committee of the War Efficiency Bureau, composed of Robert A. Woods, well-known social worker, R. Clipston Sturgis, a prominent architect, and Henry Sterling, Massachusetts representative American Federation of Labor, probably began this study first, outside of that study constantly being made by the Fore River officials themselves. The Boston Chamber of Commerce, the Boston Society of Architects, the mayor and the officials of Quincy, the Master Builders' Association have all devoted a great deal of attention by special committees; some sixteen of Boston's civic organizations have also recently aligned themselves to help.

This article is written to bring this question down to date, to show where we are, what we are trying to do and what is the next step, so that everybody can get together and think together, and work together. Greater Boston can do just as good a job as any other city in the United States, and Greater Boston is going to do it. More than six months ago the Shipping Board admitted the necessity of large housing development. England's remarkable work, wherein over $700,000,000 have been spent, pointed the way and men were sent there to study first hand their results and how they got them. They were in the same shape at the beginning of 1914 that the United States was at the beginning of 1917. Large groups of workers had to be moved from one part of the country to another. Accompanying this article are some illustrations and brief comment showing something of England's work.

In February, Congress passed our first bill for $50,000,000. J. Rogers Flannery, of Pittsburgh, was appointed housing administrator for the Shipping Board. The second bill was introduced by the Labor Department, and Otto M. Eidlitz, architect and builder of New York City, was appointed National Housing Administrator for the Department of Labor, and this bill for $50,000,000 is now pending. At this moment it cannot be stated which of these two would bring about the housing development at Quincy, as part of the Fore River Shipbuilding Company's work is for the Navy in the destroyer plant at Squantum, and the other part is for the United States Shipping Board at Fore River. Naval boats are also built at Fore River.

Prompt Starts Elsewhere

Already Philadelphia (Hog Island yards), Wilmington, Del.; Port Wentworth, Ga., have received assignments of appropriations from the United States Shipping Board. Many other places are making their surveys and determining their needs and organizing to carry out their Government housing programme. In Mr. Nolen's statement below further details appear. The situation at Fore River and Quincy is just now in the incubating state, and a number of investigations have been made, and certain investigations by the Housing Administrators at Washington representatives. In order to bring real order out of all the uncorrelated efforts the Chamber of Commerce and the War Efficiency Bureau are, upon request, selecting a committee of six. This committee will have the confidence and co-operation of the Fore River officials, and it will be a clearing house committee, acting with and through whom all other agencies in Boston may co-operate. The personnel of this committee will be announced in a few days.

Absolutely the first thing that we must do is to get together and think together and pull together. This is our part in the war just now. By way of parenthesis it has been frequently stated by those who know that more than nineteen different agencies or activities have tried to solve the question of housing at Quincy for the Fore River people, none of them being officially or financially able to do so, and the Fore River officials themselves must not be blamed at all at this time if they have devoted themselves to building their yards and building their ships and doing the thing next in hand. They have acted vigorously on certain well-recommended and authorized lines, and have improved transportation on Washington Street from Quincy Centre to Fore River by several hundred thousand dollars, and secured the new bridge from Dorchester to the Victory Plant, with installation of elevated tracks and loop.

The Way to Go About It

The next thing we must do is to find out definitely just what housing will be needed for the two plants, what land or lands are available, and what is the most practicable way to get the best results, not only for shipbuilding this summer, but also next summer and the next summer. And what is the quickest way to get good housing? The next step, based on this accurate information, will be to ask for the allotment of funds which we need, and to organize the local housing corporation of a semi-public character which the Government finances are loaned to. There are other alternatives; in some cases money may be loaned directly to the shipbuilding corporation or to private building corporations and individuals not of a semi-public character. The first method spoken of is the one which the Housing Administration officials are themselves planning first. The bill in Congress empowers the Secretary of Labor to use wide discretion in the methods his department may use. In order to present various aspects of this housing matter a number of men, each a leader in his own field, have been interviewed.

Mr. Cram Suggests

Ralph Adams Cram, architect, chairman of Boston City Planning Board and president of the Boston Society of Architects, says: "Why are we so slow in finding out what is needed in housing and in getting things done? It seems that no one of ability and authority has yet been on the job to work it out. It has been approached by many specialists, each seeing it from his own particular point of view. This all rests back upon the fact that this housing programme is new as a national problem, and it takes time to get organized to do things in a national way. It takes time to educate Congress and get bills passed.

"But there is a leak somewhere in our power to get things done quickly. I believe this lies first in our lack of unity in ideas. We must get together. Now that Congress has appropriated money and the National Housing Administrators are appointed, the next move is up to us to show what we need, and I believe we can then quickly get results.

"It is the joint conclusion of all social and business organizations who have investigated the needs of Quincy housing, as also at Bath and Portsmouth, that something must be done, and done quickly. It may safely be asked if all these men, many of them specialists in these matters, are crazy or are suffering from overheated imagination. They most certainly cannot be accused of collusion, for unity of thought is our present great need.

"This is a man's size job, to be done in a good, big he-man's way. A big wholesale operation is necessary, laid out with broad vision and broad planning. This gets all the community benefit, and as well all the individual benefit. It gets the quickest action and the lowest cost in every way.

"When properly done this will be a thing that Massachusetts can be proud of. It would have great drawing power to bring the right men to Massachusetts; it would hold Massachusetts' men here, and specifically it would draw and hold men to the shipyard work as no one other thing can. I commend this thought to those who are backing the powerful campaign of advertising to draw and hold workers in Massachusetts, and I also commend it particularly to those persons who are recruiting for the shipyard workers.

"Ultimately this would tend to reduce the congestion of Boston, and be a powerful beginning in the solution of those many ills that grow out of bad housing. We are competing for leadership, and we can lead only by becoming real leaders, and not tail-enders."

Robert A. Woods Advises

Robert A. Woods, chairman of Advisory Housing Committee of the State Council of Defence, speaking for his committee, said: "The Advisory Committee on Housing of the War Efficient Committee is one of the many branches of the organization of the State Council of Defence; its members are Robert A. Woods, R. Clipston Sturgis and Henry Sterling. The committee is satisfied that a large proportion of the six or eight thousand workers at Squantum must come from outside of Greater Boston, and that, therefore, special housing arrangements must be provided for them. To this end the following programme is recommended: 1. A system of temporary accommodations, to be provided by an existing room registry organization in the South End, from which Squantum can be reached in about half an hour. 2. Dormitories in two grades, to be erected as quickly as possible at Squantum. 3. A well-considered system of convenient and comfortable cottages to be provided at or near Squantum; a beginning to be made on this scheme at the earliest possible moment, in order that the best grade of men, with their families, may be continuously provided for."

Another Authority

Charles Collins, architect and secretary of the Boston Society of Architects, says:

"The American manufacturer awoke some time ago to the fact that added efficiency in production was effected by building factories in which every regard was had to the maximum of light, fresh air, sanitation and well-kept surroundings. The same manufacturer in many cases also realized that the actual money loss entailed in breaking in new men as a result of his labor turnover was offset by housing his operatives in such manner as to eliminate this evil. This is a pure business proposition.

"In the present crisis the Government is beginning to find that high wages alone will not hold labor at the huge new plants, which in many cases are growing up in localities either far removed from housing districts or in which the present housing facilities are being exploited or are too meagre. Where a man has to do the same thing over and over every day he becomes dull and apathetic. Where he can only find housing in localities in which tenements, one just like the other, extend in unbroken lines, his apathy is only increased. Monotony of labor can only be counteracted by variety outside of the factory. A man will come to his work every day with a new zeal and his output will be correspondingly increased if he lives in an environment of neat, clean houses, architecturally placed and architecturally treated, houses with gardens if possible and on streets with green trees, occasional park spaces, and with such amusement places, clubs, churches and stores as are essential to any self-respecting community. This is not a philanthropic movement, but a matter of dollars and cents to the great manufacturers. Moreover, it may become a matter of life and death to this country, unless public opinion is roused to a realization of the importance of this housing problem. Our Government does not want to spend the people's money in a way that the people do not wish it spent. Unless we insist on this housing problem being handled in the same manner that Germany handled it before the war, and England and France handled it since the war began, we are going to be left behind in the present struggle, and that other great commercial and economic war that is coming later.

"We have the problem at our own doors in connection with the huge plants at Squantum and Fore River. Here the housing problem should be handled on a large scale, with proper town planning and architecture. This can best be done in large community developments for which the adjacent vacant lands give ample opportunity. By no means should the spending of millions be left in the hands of the small private speculator, the results of whose untrained efforts have ruined many a suburban tract."

A. W. Joslin, a prominent builder, long active in Boston's better housing development, gives able views on how this housing should be done:

"There should be at least 1,000 flats and houses built this season somewhere in Quincy, near enough to either of these plants to in part take care of these men and their families. The houses and apartments needed should be of varying sizes, to rent from $15 to $25 per month, and they should be thoroughly and substantially built without frills, but with a due regard to architectural appearance. They should also be arranged on the land so that all houses get ample light, sun and air, each family have a yard of sufficient size for a small vegetable garden, and some landscape work should be done, so that the whole development presents a pleasing and homelike appearance. An undertaking such as this is too big for private interests to undertake without Government aid, and Congress has appropriated money for this purpose. In order to get anything like satisfactory results in regard to costs with today's prices, such a development must be carried out wholesale from start to finish.

"In order to get materials in the quantities required for 1,000 houses and flats the proposition has got to have Government backing, so that shipments will come through on Government priority orders. That something in this way of a housing development of the magnitude above mentioned should be undertaken forthwith cannot be denied.

"In spite of the high costs of labor and material, properly designed houses if built wholesale will not cost more than twenty per cent. more than just prior to the war. If an attempt is made by private capital to meet this housing need, each operator or group of operators building say from twenty to fifty houses and designing and buying independently, there will probably be an increase of at least thirty per cent. in cost over before-the-war prices. Should individuals attempt to meet this housing need, designing and building houses one by one, the increase in cost would be as much as forty per cent.

"Any attempt at housing in Quincy should be greatly helped in cost by the fact that the adjacent quarries have enormous piles of 'grout' that can be had for slightly more than the cost of hauling. Brick should be used almost exclusively for walls, as the present high prices of lumber have made the cost of a brick house but slightly more than those that are of frame. The maintenance charges on a frame house over one of brick for a period of three or four years will make up the difference."

Other Authorities Speak

William H. Oakes, president of the Master Builders Association, shows that Boston has plenty of able builders ready to do the work. William H. Sayward, the secretary of this association, and Fred E. Wilson, vice-president, are now in Washington to show Otto M. Eidlitz the real ability of the members of the Master Builders Association to produce the buildings that may be needed. Mr. Oakes' authoritative statement is that Greater Boston has the builders and they are ready to do the work.

John Nolen, town planner and an industrial housing planner, outlines what some other cities are doing to get the housing started and how they are doing it. He stated that the Wilmington, Del., Chamber of Commerce engaged him to make a report on the shipyard housing. This report was presented at Washington by the Wilmington Chamber of Commerce to the United States Shipping Board Housing Department in about one month, and was made the basis of action. It contained all the essential facts on which to decide the additional housing called for. A housing company was promptly organized and the required amount of local capital soon raised. The United States Shipping Board agreed to finance the whole operation up to at least eighty per cent. The final details of agreement are just now being written. Wilmington, Del., will secure several millions for good housing for the shipyard workers. It will be a community development, on good town planning lines and good architecture and of substantial construction.

At Troy, N. Y., where there is a Government arsenal near, at Watervliet, a representative of the Chamber of Commerce went to the Feb. 25 conference on war-time housing at Philadelphia. Returning to Troy next day, he called his executive committee, wired a town planner for a date, and on March 4, one week after the Philadelphia conference, the executive committee and town planner met, made arrangements for a report on Troy's needs, and the same successful line of action followed at Wilmington, Del., is now in progress.

R. Clipston Sturgis pointed out that 10,000 new hands are now at work and probably 20,000 all told will be at work soon at Fore River and Squantum. He said that the housing might have been anticipated and provided for had there been any authority to do it, but the facts are that no accommodations have been provided for the 18,000 workers who are new since last April.

Just a word as to the size of this undertaking. It may look like a large operation. Three or four million dollars at Quincy and the Government's whole programme of a $100,000,000 look large when viewed as a single lump sum; but the facts are that the amount of housing built in the United States each month in normal times is $125,000,000. In Boston alone in a normal year it is $1,000,000 per month, but last year in Boston the housing was less than $400,000 per month. Building has not been keeping up with the normal needs, and this puts Boston in much poorer shape than usual. The same is true of all surrounding towns and cities, except that Quincy built up to normal last year. Taken by and large, it's a little thing to do: it simply requires that we get together and do it.

Stone Houses In Italy

Beds of excellent clay suitable for brick and tile making, good building stone, and limestone capable of yielding fine qualities of lime and cement are to be found in almost every part of Italy, writes Consul F. T. F. Dumont, from Florence. Centuries of scarcity of lumber have developed methods of construction in which a minimum of lumber is used. A surplus of labor has kept wages at a point that makes stone and brick construction possible at prices that would seem incredibly low in new countries. Good modern houses are built almost entirely of stone, brick, and plaster. Stone is used for foundations, walls and partitions and brick for finishing door and window openings and topping walls where suitable stone cannot be found, while plaster is applied directly to the exterior and interior walls for finishing purposes. Floors are composed of light iron I beams, suitably spaced, between which a flat arch of hollow tiles is laid, the top of the arch being slightly below the top of the beam while the bottom projects below the bottom of the beam. The floor is either cement sufficiently deep to give a uniform surface, which is painted, or else a cement base in which tiles can be laid. Interior walls are kalsomined. Moldings, baseboards, cornices, steps, etc., are done in stone or cement, as are door and window sills. All interior ornamentations are in plaster of Paris or cement. Roofs are flat and tiled like floors. Ceiling plaster is applied directly to the arch tiling. New buildings usually conform in style to those erected in former centuries. Only doors and window frames and shutters are of wood.

Standardized School Buildings

UNDER the reorganized Board of Education of New York City standardized plans for new public school buildings have been adopted, and future structures will be erected in accord therewith. A notable feature in the accepted plans is the large amount of space allowed for playing, both upon the grade floors and the roofs. It is held buildings under the standardized plan can be erected far more economically than was formerly the case.

Dwelling Houses in Indianapolis

SOME day Indianapolis, Ind., will experience a sweeping conflagration, and the citizens of the community who have not studied building conditions closely will be astonished that such a disaster was possible.

Close observation, however, will make the danger clear, and such compel the speedy completion and intelligent enforcement of the new building code which has been in course of preparation for several years now.

The following truths concerning the situation have been given us concerning Indianapolis by one familiar with the city and who has had exceptional facilities for investigating its general building construction:

"Although Indianapolis can offer less excuse for crowding its dwellings than almost any other city in the country, the fact remains that it has row after row of closely centered frame structures, and that these afford ready and dangerous channels for the passage of fire.

"Located in a flat country, and without topographical limit, so far as desirable building sites are concerned, the constant tendency is toward concentration, and with all the ill effects such practice induces. Possessing one of the finest interurban railway systems in the country, it is hard to understand why the suburban territory is not more generously seized upon for desirable home building.

"Compared with the prices ruling in cities of like size land is cheap in Indianapolis, while the absence of undulations makes inexpensive the installation of such public utilities as sewer, water, gas and water mains. Thus citizens of Indianapolis have not the excuse of severe expense for building upon narrow frontage lots.

Fault of Building Code

"Again, the Building Code of the city, copies of which, by the way, are exceedingly hard to obtain, permits the erection of the dangerous wooden buildings close to the property line and proximity to one another. In hundreds of cases they are not more than four feet apart. Even the residences standing upon the old fair grounds, which are considered modern and cost to build anywhere from ten to twenty thousand dollars apiece, are within six feet of one another.

"And these conditions are permitted under the building ordinances.

"No wonder that in Indianapolis when a dwelling fire occurs three buildings usually sustain total or partial loss.

Partial to Frame Construction

"The partiality of the city toward wooden buildings is shown in the following table taken from the record of building operations in Indianapolis during the years 1910-11-12 and 13:

Frame dwellings	$14,212,880
Additions and alterations (frame)	2,813,189
Frame miscellaneous	1,275,000
Frame stables and sheds	250,106
Total	$18,551,175
Fireproof	$ 7,627,453
Brick	4,121,893
Brick stables, etc.	50,021
Brick addition alteration	562,637
Brick miscellaneous mixed construction	1,275,000
Concrete block and concrete	2,316,855
Total	$15,953,857

"As the masonry buildings are largely mercantile and located in the business district it will readily be inferred that the frame structures number several times more than those of the fire resistive type, and to that extent multiply the conflagration hazard of the city.

"Verily the residents of Indianapolis have cause to be exercised over the fire menace of their city and if they are wise in their generation, they will take prompt measures to change the existing status."

Industrial Housing in England

Housing will have its place in later problems quite as much as in the midst of the industrial activities of war, if England's expectations afford a criterion.

By the end of 1918 England expects a shortage—computed much in the way we used to arrive at car shortages, by comparing the unmet demands with the surplus over requirements—that will amount to 300,000 houses. If each of these houses is constructed after the plan of the modern British cottage, with a living room, a kitchen and three bed rooms, a man with a penchant for statistics declares that there will be needed 6,000,000,000 bricks, 3,000,000 doors and frames, 300,000,000 roof tiles, 120,000,000 slates, 23,400,000 square feet of glass, 2,500,000 windows, 500,000 tons of cement, 600,000 tons of lime and 300,000 staircases.

As England has never seen more than 150,000 houses built in a year, it looks forward to a shortage in materials, and the Minister of Reconstruction has accordingly appointed a committee to consider ways and means.

To Protect Human Life and Property Against Loss by Fire

THE National Fire Protection Association, assembled in Chicago for its 22nd annual meeting, again calls attention to the unusual hazards to life and property created throughout America by the world war. These hazards demand the utmost vigilance and initiative not only from those in authority, but from the private citizen as well. Every individual should consider himself a fire warden of the nation at this critical time and should equip himself to serve his country by safeguarding to the extent of his intelligence and ability every form of natural and created resource. The elimination of waste, at all times the duty of good citizenship, is at this moment our profoundest public and private responsibility.

In its warfare against the needless sacrifice of human lives and property by fire, the association advocates the following measures:

1. The adoption by municipalities of the Standard Building Code of the National Board of Fire Underwriters to the end that fire-resistive building construction may be encouraged, the use of inflammable roof coverings prohibited, adequate exit facilities from buildings assured, and interiors so designed and firestopped as to make easy the extinguishment of fires therein.

2. The adoption by all states of minimum building requirements for the protection of state and county hospitals, schools, asylums and similar institutions outside city limits and of small communities in which the establishment and enforcement of a building code is impracticable.

3. The enactment by each state of the fire marshal law advocated by the Fire Marshals' Association of North America to the end that official investigation may be made of the causes of all fires, preventable fires may be eliminated by public education, and the crime of arson stamped out.

4. The adoption of the association's suggested ordinance providing for the systematic inspection of all buildings by city fire marshals or local firemen to insure the vigorous enforcement of rules for cleanliness, good housekeeping, and the maintenance of safe and unobstructed exits, fire-fighting apparatus and other protective devices.

5. The enactment of ordinances similar to that of Cleveland, Ohio, fixing the cost of extinguishing preventable fires upon citizens disregarding fire prevention orders, and a more general legal recognition of the common law principle of personal liability for damage resulting from fires due to carelessness or neglect.

6. The wider general use of the automatic sprinkler as a fire extinguishing agent and life saver and the more general adoption of the fire division wall as an important life saving exit facility.

7. A careful study of the technical surveys of cities by the engineers of the Committee on Fire Prevention of the National Board of Fire Underwriters covering the items of water supplies, their adequacy and reliability, fire department efficiency, fire alarm system and conflagration hazards, and of the possibility of co-operation among neighboring cities through mutual aid and the standardization of hose couplings.

8. The adoption of the association's suggested laws and ordinances for state and municipal regulation of the transportation, storage and use of inflammable liquids and explosives.

9. The universal adoption and use of the safety match and legislation prohibiting smoking in all parts of factories, industrial and mercantile buildings except in such fireproof rooms as may be especially approved for the purpose by fire departments.

10. The education of children and the public generally in careful habits regarding the use of fire.

11. The co-ordination of all these activities, through a central administrative officer or body of the state or city having primary jurisdiction for the purpose of promoting uniformity of action and efficient co-operation.

In the furtherance of these objects the association appeals for the co-operation of all citizens. It asks them to help in the dissemination of its valuable literature and in the use of the standards of fire protection so carefully worked out by its committees to the end that the lives and substance of our people shall not continue to be dissipated by a reckless and easily preventable waste.

* * *

Activities of the N. F. P. A. During the Year

IN reviewing the principal activities of the National Fire Protection Association during the past year, its secretary, Franklin H. Wentworth, said:

"In the fiscal year just closed the association has not escaped the storms and stress which have been the common lot of its sister associations. Many of our members within the age of military service have gone into the army and navy; many have changed their occupations in civil life. But as strenuous efforts at the beginning of the war overcame the losses in our Canadian membership, so our efforts for new memberships during this year have not only maintained but increased our total list. In spite of our losses our associate membership shows a gain for the year of 92, and we have at last passed the three thousand mark, our books showing on April 30 a total associate membership of 3,014. Two organization memberships were lost by the consolidation of three inspection bureaus, one member now representing the three, making our present number of organization members 130. Our members have seemed to realize their special responsibility during this time of the nation's need, our heavy office correspondence testifying to this, revealing many cases of quiet, watchful service to fire prevention, unknown to the public or to official life.

"It is now over a year since the publication of our monthly 'News Letter' was begun. It has established itself as an indispensable feature of our service, prized both by our members and by our press exchanges. The twelve issues of the year aggregated 42,000 copies. The edition of the proceedings of the last meeting of the association, a book of 428 pages, was 3,800, and 3,800 copies of our year book and membership directory were printed. Differences of opinion seem to exist as to the most convenient method of listing the members in the directory. Some members would prefer a straight alphabetical arrangement after our old method; others think our present plan of locating members in their respective cities is especially desirable. To list the addresses both ways would make the cost of the year book prohibitive, as under the present plan its printing and mailing costs over $500 per year. Perhaps the members present at this meeting may desire to discuss this matter of the directory.

" 'Field Practice,' the association's inspection annual, has continued in demand. We have a fair quantity of these books yet on hand. The educational publications of the year will be reported by the Committee on Public Information.

"The 'Quarterly' has now completed its eleventh year. The edition has been again increased, the total number of copies printed being 14,600, 1,200 more than last year. The following 15 members contributed special articles during the year: A. T. Bell, George W. Booth, W. J. Canada, M. L. Carr, Walter A. Hull, Edward H. Keith, Robert D. Kohn, R. B. Matthews, H. L. Miner, John J. McCarthy, R. L. Rowley, R. E. Swearingen, Hermann von Schrenk, C. F. Wagner, Charles E. Worthington. Tabulated fire records were carefully worked out and published during the year, on two classes of properties, groceries and motion picture houses, and a special analysis made of sprinkler fires in which a large loss was sustained. The annual summary of statistics in properties having automatic sprinkler protection was published as usual in the closing number of the current volume.

"It should be a matter of peculiar pride to the association that three of its oldest members have been chosen by the Government to direct the Fire Prevention Section of the War Industries Board. This recognition of the abilities of Mr. Merrill, Mr. Mallalieu and Mr. Pierce proves the value of a background of experience at a time of common need. Many other less prominent positions of responsibility in Government fire prevention work are being held by members of the association, and other positions remain yet to be filled. The war has created such a demand for a knowledge of fire protection that our mail is laden with requests for help, not only from official, but from civil sources, because in the years past practically every man in the country having an interest in fire protection has come into our membership. It is not the least of our satisfactions to realize that our meetings, our discussions and our literature have been steadily these many years equipping our members for their present service. It is the past of experience that makes the future of power.

"We all want our lives to count for something, and if during the years of peace we shall have by patient labor fitted ourselves for a special service other men cannot render in this day of war no matter how humble our station in the general scheme may be, we shall not have worked in vain."

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AUTOMATIC SPRINKLERS

Edited
IRA G. HOAGLAND, Secretary **PAUL MASON, Special Representative**
National Automatic Sprinkler Association

Sprinkler Efficiency Often Nullified by Structural Defects and Human Dereliction

SPRINKLER efficiency is so largely a question of maintenance—i. e., the personal responsibility of the building owner or occupant for the operative condition of the equipment—that the story of that efficiency ofttimes is more clearly understandable after consideration of the statistics of unsatisfactory automatic control of fire than if only the figures of satisfactory control are regarded. For it is in the former table that the record of human dereliction is made—acts of commission or sins of omission that make for losses rather than fires controlled.

Structural conditions of great importance and often of dominating influence in determining the final record also are reflected in this table of unsatisfactory fire control; listed under two headings—"unsprinklered portions" and "faulty building construction, concealed spaces, unprotected vertical openings, etc." The first is a sin of omission of the first magnitude; the second, one of commission of equally vital import. Prospective builders, and others charged with responsibility for safety of life and property in buildings under their control, should bear these two points constantly in mind.

Illuminating Figures

The records of the last five years, dealing with these phases, as compiled by the National Fire Protection Association, show that more than 12 per cent. of the cases of unsatisfactory control have been due to these two causes, both clearly within the scope of personal responsibility for structural conditions. The figures follow:

	Unsprinklered Portions		Faulty Construction		Total	
	No.	Pct.	No.	Pct.	No.	Pct.
1913-14	3	6.8	4	9.1	7	15.8
1914-15	2	3.6	2	3.6	4	7.2
1915-16	10	19.5	3	5.9	13	25.4
1916-17	2	5.3	—	—	2	5.3
1917-18	2	4.5	1	2.3	3	6.8

The total of 29 cases thus recorded constitutes 12.1 per cent. of all instances of unsatisfactory control during the lustrum. It is not possible to make a direct comparison of totals with the 21-year record to April 1, 1918, as during part of those years "unsprinklered portions" were grouped with "generally defective equipment," etc., the aggregate for the period being 204, with a percentage of 22.8.

With respect to "faulty construction," however, the 5-year total of 10 and percentage of 5.22 compares with a total of 39 and percentage of 4.4 for 21 years; which may be taken to indicate that buildings previously erected with the serious defects grouped under this heading have been reaping the harvest sown in the dereliction of their builders to a greater extent during the last five years than the 21-year average.

Serious Maintenance Problems

It is when causes involving responsibility for maintenance are considered, however, that the detrimental influence of human dereliction becomes most clearly apparent; although in some phases the record for the year just closed is more favorable than for the entire period covered by the compilation. It is particularly gratifying that, for the first time in five years, there is both an actual and a relative decrease in the number of unsatisfactory controls due to the shutting off of water from sprinklers. The total for the year was 11, or 25 per cent., compared with 241, or 26.9 per cent. for 21 years, and a total of 76, or 41.05 per cent. for the preceding four years. Figures for the last five years, with comparisons with the complete periods of compilation, follow:

	No.	Pct.		No.	Pct.
1913-14	19	43.1	1897-1914	173	24.5
1914-15	20	36.4	1897-1915	193	25.3
1915-16	19	37.3	1897-1916	212	26.1
1916-17	18	47.4	1897-1917	230	27.0
1917-18	11	25.0	1897-1918	241	26.9

This decrease in the number of instances of water turned off takes on added importance from the fact that there were more fires in sprinklered risks during the fiscal year just closed than during the preceding year—1302 compared with 1262—so that this dereliction represents only .845 of 1 per cent. of the sprinklered risk fires of the year, compared with 1.427 per cent.—the record of the preceding year.

Unfavorable Freezing Record

It is when the item "Sprinklers Crippled by Freezing" is reached that maintenance dereliction makes its black mark in the 1917-18 record, with a total of seven fires and a percentage of 15.9, compared with a total of 25, or 2.8 per cent., for the 21-year period. As liability of equipments to freeze is virtually dependent on maintenance in entirety, the great increase in the number of these unsatisfactory controls is of great and disquieting moment. That 28 per cent. of all unsatisfactory controls in 21 years should occur in one year is an emphatic confirmation of the conclusion reached long ago by the best informed fire control engineers that freezing of sprinklers is a psychological and not a meteorological hazard.

With thousands of equipments crippled by freezing, or drained to prevent freezing, the country was fortunate that there were only seven fires during last winter in which control was unsatisfactory owing to this cause. It was good fortune rather than good management, for the cause of the crippling was found in specific factors, such as lack of fuel, lack of care in maintenance, lack of vigilance in safeguarding, rather than in the general factor of the extreme and long-sustained Arctic weather.

Emphasizing the fact that it was good fortune, rather than good management, that there were so few fires, it may be cited that New York had more than 800 crippled equipments; there were more than 700 in New England— Chicago had hundreds; Cincinnati had about 60; several hundred were scattered throughout New York State, outside the Metropolis, and with few exceptions, cities in all parts of the country where freezing weather prevailed reported all the way from a few to scores. In Chicago some equipments were out of service from a month to six weeks.

Obstructions to Distribution

Satisfactory control by sprinkler often is prevented by obstructions to distribution. This is a fault often found in mercantile and manufacturing establishments. In the former, shelving is installed and tables or counters are placed so that water from sprinklers cannot reach a blaze starting in or under them; in the latter work benches frequently have the same effect, and in the stock rooms of both, goods and materials often are piled so high that they prevent proper distribution of water from the heads. With respect to this cause the record of the year just closed is distinctly favorable, comprising, as it does, two fires, or 4.5 per cent., against 54, or 6 per cent., for the 21-year period.

As compared with the preceding four years, the record of the last year is even more favorable, with two, or 4.5 per cent., against 19, or 9.8 per cent. for four years, and an average of 8.7 per cent. for the lustrum. In all probability there is no dereliction, with the exception of turning off the water, against which those responsible for sprinkler efficiency are more frequently and insistently warned, than permitting obstruction to distribution of water from the heads. It is exceedingly gratifying to note that these admonitions seem to be bearing acceptable fruit.

General Sprinkler Record

Turning to the general sprinkler record, it is seen that of the 1,302 fires recorded during the year, satisfactory control was exerted over 1,258, or 96.62 per cent., compared with 19,202 out of 20,097 fires in 21 years, or 95.55 per cent.—a clear gain of more than 1 per cent. for the year. As the record for the preceding fiscal year also showed a gain of more than 1 per cent. as compared with the 20-year period, it is easily discernible that sprinkler efficiency is steadily, if slowly, bridging the narrow margin of unsatisfactory controls that yet stands between it and perfection.

A certain proportion of the gain is clearly to be credited to increased efficiency of alarm systems, supervisory alarm systems having made a record of 100 per cent. efficiency and sprinkler alarms of 93.7 per cent.

Of all fires in sprinklered risks, 70.4 per cent. were controlled by five heads or less and 82.6 per cent. by 10 heads or less.

The Brick Trade

From present indications the country may find itself short of brick before the summer is over. The production was already light and many plants had not started up this season. Meantime, here came the curtailment order which puts an enforced limit on the production.

Now along come reports from various sections of country stating that brick are scarce among dealers in building material. With both the natural and the enforced curtailment and these reports of scarcity coming along, it looks as though in many sections of the country, before the summer is far advanced, the main problem will be where to get brick, not where can we sell it.

This means that those who have brick, instead of getting nervous and unloading at any price they may be able to obtain, should look about and see first. While building operations as a whole are limited and lower than normal, there is an actual increase in activities in some sections, while in other sections there is a natural scarcity of brick. So, unless the signs read wrong, brick will be brick before the year is out. Don't give away or sacrifice what you have on hand, but get a price for them or hold them a while and watch the outcome.

SAFE HOMES

***Edited by* RALPH P. STODDARD, Secretary**
Society Advocating Fire Elimination

A Harmonious Group of Houses

WHEN the B. R. Deming Company opened its new residence tract on "The Heights" just outside the city limits of Cleveland, it cast about for a feature which would distinguish it from all other allotments there. Its plan was an original one, that of building high-grade and therefore relatively high priced homes, placed upon attractive plots, for sale complete. Its officials finally hit upon the plan of making it a consistently fire-safe allotment, a plan which never before had been followed out in Cleveland upon so large a tract, although proven a success in the east.

Its "Euclid Golf Neighborhood" therefore was the first large residence district of Cleveland to be developed upon this principle. A glance at the houses in the accompanying cut will serve to show the excellent manner in which its plan has been executed. The buildings show a wide range of prices, so that any family desiring a distinctive home may find satisfaction among its offerings. At the same time, the houses are of a class which insures exclusiveness and bars the speculative builder effectually.

Construction of the houses incorporates every class of established fire-safe materials, brick, stucco, tile, stone, etc. Advantage was taken of the quantities of natural stone underlying the tract to construct a number of the more expensive homes of this material.

The net result is a tract in which every home, while being consistently fire-safe, is designed with a thought for its neighbors and which harmonizes with them.

What town will be next?

JUST think back. How often has your newspaper, fresh from the press, cried out the news of another fire and for days after, fed you piecemeal the whole tragic story of death, loss, privation and distress? Fate seems to time these shocks by some weird schedule so that ere one horror dulls in memory, it strikes again.

What town will be next? Who knows? It may be a quiet hamlet, or a busy factory town helping to build America. It may be a great city.

But the day is coming when we shall not consider what town will be the next, because roofs will be fire-safe. Buildings will no longer be topped with tinder, and when that day comes, fire's path will be blocked. You can see this working out in your town.

Up the street there's a cottage shingled with Johns-Manville Asbestos. Through the trees you see a stately mansion, with its beautiful roof of these same shingles in specially blended colors. Here's a garage — over there a great factory with a roof of the same material. All Johns-Manville Asbestos — all roofed for safety.

The demand for the fire-safe roof is growing fast, and with your own interest at heart you can help it by using any of the roofings listed below.

Johns-Manville Asbestos Roofings: Asbestos Built-Up Roofing; Asbestos Ready Roofing; Corrugated Asbestos Roofing; Colorblende Shingles; Transite Asbestos Shingles.

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10 Factories—Branches in 61 Large Cities

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The Fireproofing News

CONTAINING DETAILED DESCRIPTIONS OF NEW DEVICES AND APPLICATIONS OF MATERIALS WHICH ARE OF REAL VALUE IN FIRESAFE BUILDING: ALSO NOTES ON THE LATEST BOOKLETS, CATALOGS AND OTHER FIRESAFE LITERATURE, WITH OTHER ITEMS OF INTEREST TO THE FIREPROOFING FRATERNITY

LATEST EDITION

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New York City, N. Y., May, 1918

Priceless

Roofing Materials in Norway

Previous to the war most of the better classes of roofing materials used in Norway were imported from Germany and Belgium, writes Vice-Consul Ralph A. Boernstein from Christiania, under date of March 8. Norwegian importers have been unable to obtain goods of this kind from Germany for the past three years, as most of the factories formerly engaged in their production have been converted for the manufacture of articles necessary to the prosecution of the war.

American manufacturers of roofing materials had not, as far as can be ascertained, made any real attempt to exploit the field and local dealers are doubtful if they could have competed with the German and Belgian products, which were offered at prices believed to be considerably lower than the American exporter could afford to quote. With the closing of its principal sources of supply however, Norwegian importers turned to the United States in an effort to secure their requirements and a large proportion of the high-grade roofing materials used here came from America.

Holland, Sweden and Denmark have also furnished some varieties of roofing materials. The first named controls this market for black clay tiles of the best class which are extensively employed on city structures, and also supplies a large percentage of the high-grade slate used. Norway possesses numerous slate quarries from which are produced the poorer qualities of slate roofing. Red tiles of an inferior grade, used principally for farm houses and other buildings in the rural districts, are also of domestic manufacture.

Waterproof Stains for Wooden Shingles

The demand for ordinary wooden shingles is easily met by Norwegian concerns. The country is rich in timber suitable for shingle making and the recent introduction by an English concern of various kinds of weatherproof stains for the preservation and beautifying of shingle roofs has lent a considerable boom to the employment of this style of roofing. Stains of this kind are being used with increasing popularity on bungalows and country homes of the better class. The British company is at present the only firm selling preservative stains in this field and it is believed that American stains of similar quality would find a ready sale here.

American Roofing Paper

The principal product secured from America is the high-grade roofing paper. American exporters have been able to hold this trade during the war in spite of the high freight rates. On a roll of 216 feet, costing perhaps $5, the freight charge often amounts to $7, or more than the entire cost of the goods. The quality of the American article has been found very good, and as the United States is practically the only source of supply now open to the Norwegian importer, the necessary supplies will continue to come from that source. Whether the American product can compete with European goods after the close of hostilities depends largely on ocean freight rates. The war has thus, at least, made known to the Norwegian importer the good quality of American-made roofing materials, and they unquestionably will have his careful consideration even after such time as Germany may again be in a position to enter this field.

The Norwegian Government has been buying considerable quantities of roofing goods for use in the construction of warehouses and munition works. One Christiania dealer alone sold 150,000 square feet of American roofing paper to the government in 1917. The tendency of the government now appears to be to purchase direct from roofing material dealers here and no longer to consign the buying to building contractors. The best method, therefore, by which American manufacturers can secure government contracts would appear to be by means of the establishment of an agency with some reliable and energetic firm here. It seems that the great bulk of government buying has ceased for the time being, but it is believed there will continue a steady normal demand from that source.

Several Norwegian factories engage in the manufacture of tar and roofing paper of poor quality, but their products are of such low grade as to be suitable only for certain purposes.

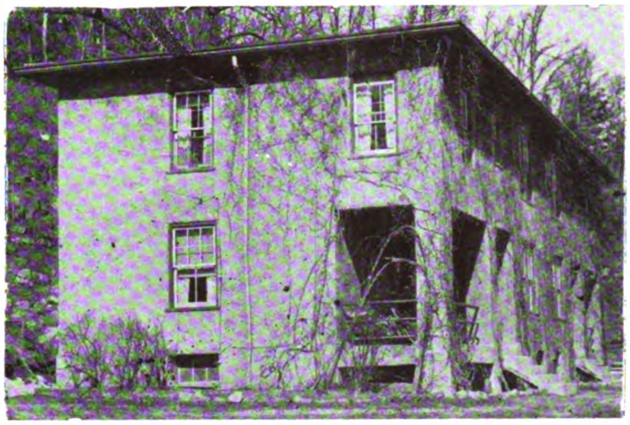
It is not believed there would be more than a limited market for special brands of roofing, such as fireproof shingles, rubber and composition plates, etc., but several dealers have manifested interest in such goods and requested catalogues and samples.

Views of concrete houses built by steel forms manufactured by the Hydraulic Pressed Steel Company, of Cleveland, Ohio, are shown in the new catalogue issued by the corporation, a copy of which will be sent to anyone properly interested in home construction.

Catalogue No. 33, of Fiske and Company, Inc., New York City, tells of the merits of "Fisklock-Tapestry" brick, and contains a number of highly artistic residences to which the product was used.

BUILD IT OF MASONRY MATERIALS

Build Industrial Houses That Resist Fire



A Twin House, Tuxedo Park, N. Y. 11 Years Old

This house is built with Berger's Metal Lath applied on Metal Lumber framing. It was built in 1907. The picture was taken just a few weeks ago. Note that the stucco is in perfect condition. Our engineering department will gladly co-operate with you in planning durable, economical, fire-resistive buildings of any kind. Correspondence invited.

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Asbestos-Cement Roofings

Asbestos-cement may be obtained in several different forms, namely, "slates," corrugated sheets and the plain sheets. "Slates" may be obtained in various sizes, but 15 in. by 15 in. is sometimes employed.

The form of asbestos-cement employed for walls is either the corrugated or the plain sheets. These are generally 3-16 in. in thickness, and the color commonly used is gray. Buildings constructed of asbestos-cement walls are mostly timber-framed, and until the advent of this new material would have been constructed with corrugated iron sheathing. The sheets are simply nailed onto the uprights and sills of the structure, and the joints covered with wooden strips. These strips lend themselves to artistic arrangement, and many attractive schemes of panelling are possible without any appreciable extra cost. Horizontal joints should have zinc, lead, or felt strips laid underneath the top sheet and over the bottom sheet for the space of 1 in. or 1½ in. each way, in order to prevent the access of water to the inside of the sheets. The usual wooden strip may then be fixed if desired. Although in temporary buildings this precaution is often neglected, it is not advisable to "spoil the ship for a ha'porth of tar."

Corrugated asbestos-cement sheets, though much stronger than plain sheets, are not so adaptable and easy to fix as the latter. But a good use for them consists in their employment in lieu of corrugated iron sheeting for roofs. Owing to their strength, they are suitable for this purpose.

When designing a building to be constructed of either plain or corrugated sheets it is well to remember that they are very brittle. In consequence, any positions which are likely to have rough treatment should be protected by wood skirtings, plinths or some other form of protection.—H. C. Bertram Parkes in "Building World."

Some 500 industrial homes in addition to a number of general buildings will be erected at Wilmington, Del., in accord with plans prepared by Ballinger and Perrot of Philadelphia. The cost of the enterprise, it is figured, will be close to $2,500,000.

Within a short time it is expected work will begin upon three new hotels at St. Paul, Minn., the estimated cost of which will be $1,000,000, $1,500,000 and $2,000,000 respectively.

Offices of the National Association of Marble Dealers have been transferred from New York City to Milwaukee, Wis.

A. P. Sandles was recently chosen secretary of the National Crushed Stone Association.

With a capital of $100,000 the Kingwood Stone Company of Kingwood, W. Va., was recently organized.

New Name But Same Old Quality of Product

The name of the Asbestos Protected Metal Company of Pittsburgh, says the "American Roofer," has been changed to Aspromet Company. In explanation of the change the company says: "When this company was established in 1905 our sole product was asbestos protected metal. Our entry into the building material field with a product which met with such universal favor naturally resulted in our complementing the same by adding to our line other building materials that were used and bought by the same people who use and buy asbestos protected metal. This we have done until we have now a very complete line of building material specialties, many of which contain neither asbestos nor metal in their make-up. Thus the descriptive name, Asbestos Protected Metal Company, which served us so well originally, became restrictive to the point of being misleading, and hence we make the change."

J. I. Banash Promoted by Underwriters' Laboratories

J. I. Banash, for eleven years actively engaged as engineer at Underwriters' Laboratories, in the examination and testing of hazardous appliances, has been appointed engineer-in-charge of the casualty department. He succeeds S. V. James, who is now mechanical engineer on special research work at the laboratories.

Mr. Banash is a graduate of the Massachusetts Institute of Technology, a member of the American Society of Mechanical Engineers, the National Fire Protection Association, The National Welding Council and the International Association of Fire Engineers. He has done much work with committees of these associations in preparing specifications for the manufacture, use and maintenance of appliances involving fire and accident hazards with the end in view of reducing these hazards.

The variety of appliances submitted to the Casualty Department is a matter worthy of note. A few among them are: goggles for many purposes, including those for welders; ladders; guarding devices for power driven machines, elevator couplings, locking devices, anti-slip treads, scaffolding machines, window-washers' safety belts, etc. The experience which Mr. Banash brings to the department will be of special advantage in meeting the problems of devising test apparatus and standardizing test methods frequently difficult and complex.

Patriotic Employees of Berger Manufacturing Co.

In the Third Liberty Loan campaign the employees of The Berger Manufacturing Company, Canton, Ohio, subscribed for a total of $112,750 worth of bonds; 98.8 per cent. of the employees subscribed. This campaign was put across by about 75 team workers organized into six different teams.

As an appreciation of the work of the committeemen the Berger Manufacturing Company entertained them at a dinner given at the Courtland Hotel, Canton, Ohio, the evening of April 23. The guests were addressed by Geo. H. Clark, chairman of the Draft Board, whose patriotic appeal stirred them to such an extent that there was a unanimous decision to organize immediately a Berger Auxiliary for the Council of National Defense, this Auxiliary to extend throughout the plant, every employee being invited to join.

At a meeting held four days later in the plant the charter members effected a permanent organization electing W. H. Koontz, Welfare Dept. President, and Howard Miller, Product Inspector, Secretary and Treasurer. One vice-president will be chosen by each team.

The object of the council is to render efficient co-operation in connection with all war campaigns.

Truscon Steel Company

A business organization furnishing meritorious products and service often finds in its successful growth that its original name is inadequate to cover its wider fields of activity. An example of this kind is the Trussed Concrete Steel Co., which in its early days, years ago, devoted itself exclusively to reinforced concrete, introducing many new reinforcing products such as the Kahn Bar, Floretyles, etc.

For many years, however, the activities of this organization have expanded far beyond the concrete field so as to include a large variety of steel products. Prominent among these might be mentioned the steel windows so widely used in building work, metal lath, pressed steel joists, all-steel buildings, inserts and other specialties.

Fortunately, in selecting a name embracing all its present activities this company can readily follow the trend of popular suggestion. For years the company has been generally known by the name "Truscon"—a simplified abbreviation of the longer name. Therefore, "Truscon Steel Company" was selected as the new name of the company.

Aside from this simplification of the name of the Truscon Steel Company, there has been absolutely no change in the company, its organization or management in any way. Representatives, locations and everything about the company are identically the same.

The new name is the Truscon Steel Company, with plant and general sales offices at Youngstown, Ohio, and representatives in principal cities.

Present and prospective Texas patrons of the H. W. Johns-Manville Company are advised that on and after July 1st, its Houston office will be located at 424 Washington Avenue.

The attractive new catalogue of the Art Store Company, of Waynesboro, Pa., illustrates in colors the concrete and composition marble products of the concern.

The Average Man's Home

Practical Homes

ARCHITECTS, real-estate dealers, and prospective home builders will find the above plan books of pronounced help in selecting designs for houses to cost from $3,000 to $5,000 each. The plans were prepared by architects in all parts of the country, with the primary thought of designing houses that are at once attractive, convenient and economical as to cost of construction.

The price of either book is $1.00 per copy. Both can be had for $1.50; or either will be given as a premium to a year's subscription to CONSTRUCTION—the only National Firesafe Building publication in existence. A regular feature of CONSTRUCTION is its Safe Homes' Department, containing illustrations and plans for homes of fire safe types, designed for use of the man of modest means.

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If you are a Manufacturer of Firesafe Material or Protective Devices,

consistent presentation—in season and out—of your product in CONSTRVCTION cannot fail to result favorably because the success of this publication depends upon

(1) how well it advances and proves the argument for proper fireproofing

and

(2) what it actually accomplishes to increase the use of firesafe materials and devices.

The first objective is attained (intensively) through the editorial, news and advertising sections of CONSTRVCTION and (extensively) by sending the magazine over the entire country to all the business and professional interests related to building, planning, construction, equipment and maintenance.

The second purpose is accomplished by **actively fighting for legislation favoring firesafe construction** and against laws permitting the continued use of wood—and remember that no company can do this work as effectively as a publication, that the "fireproofing fraternity" at present is a composite unorganized body comprising a number of separate units representing more than a dozen industries, that there is practical need of a national mouthpiece such as you have in CONSTRVCTION, that **makers of fireproof materials are now getting but one per cent. of the business which ought to be theirs,** that advertising in CONSTRVCTION is helping yourself to get more orders, giving your goods the representation they deserve—and according this publication the cooperation it merits.

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Why Compromise With The Window Problem?

Window efficiency lies not alone in securing an efficient window but also in securing the particular type of window best adapted to the particular conditions encountered. This can be had, not from the "one window" line, but from the diversified line which permits a choice. Why compromise with some "all-around" window that is sure to be lacking in some feature essential to efficiency?

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We call them "Safety First" because they protect from rain or storms, from heat or cold and from the common agencies which spread fire.

Reynolds Shingles are the standard asphalt Shingles and you will make no mistake in insisting on Reynolds Shingles.

If your dealer cannot supply you write the factory.
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"Originators of the Asphalt Shingle"
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ADVOCATING THE CONSISTENT VSE OF FIREPROOFING MATERIALS & PROTECTIVE DEVICES

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Ralph P. Stoddard, Associate Editor
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Wm. Wallace Ewing, Consulting Eng.
George H. Stewart, Business Manager

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The above reproduction graphically illustrates the fire-resisting qualities of

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It shows part of a large industrial plant destroyed by fire and an adjoining building covered with Ambler Asbestos Corrugated sheathing which was unharmed by the flames. In this instance as in many others, our Corrugated Roofing and Siding proved to be better than an insurance policy.

Besides being fireproof it is sufficiently elastic to allow of marked tension due to vibration, expansion and contraction of surrounding parts, wind pressure, etc., without cracking or breaking in any manner. Once put on, it stays on as long as the building stands, and it never needs painting or repairs, the first cost is the only cost entailed.

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We have manufactured exclusively for us a Corrugated wire Glass to be used for skylights in conjunction with Ambler Asbestos Corrugated Roofing. It makes a non-leakable fireproof skylight. Easily put into place and is much more economical than other types of skylights.

A word from you will bring the whole story—prices, pictures and samples.

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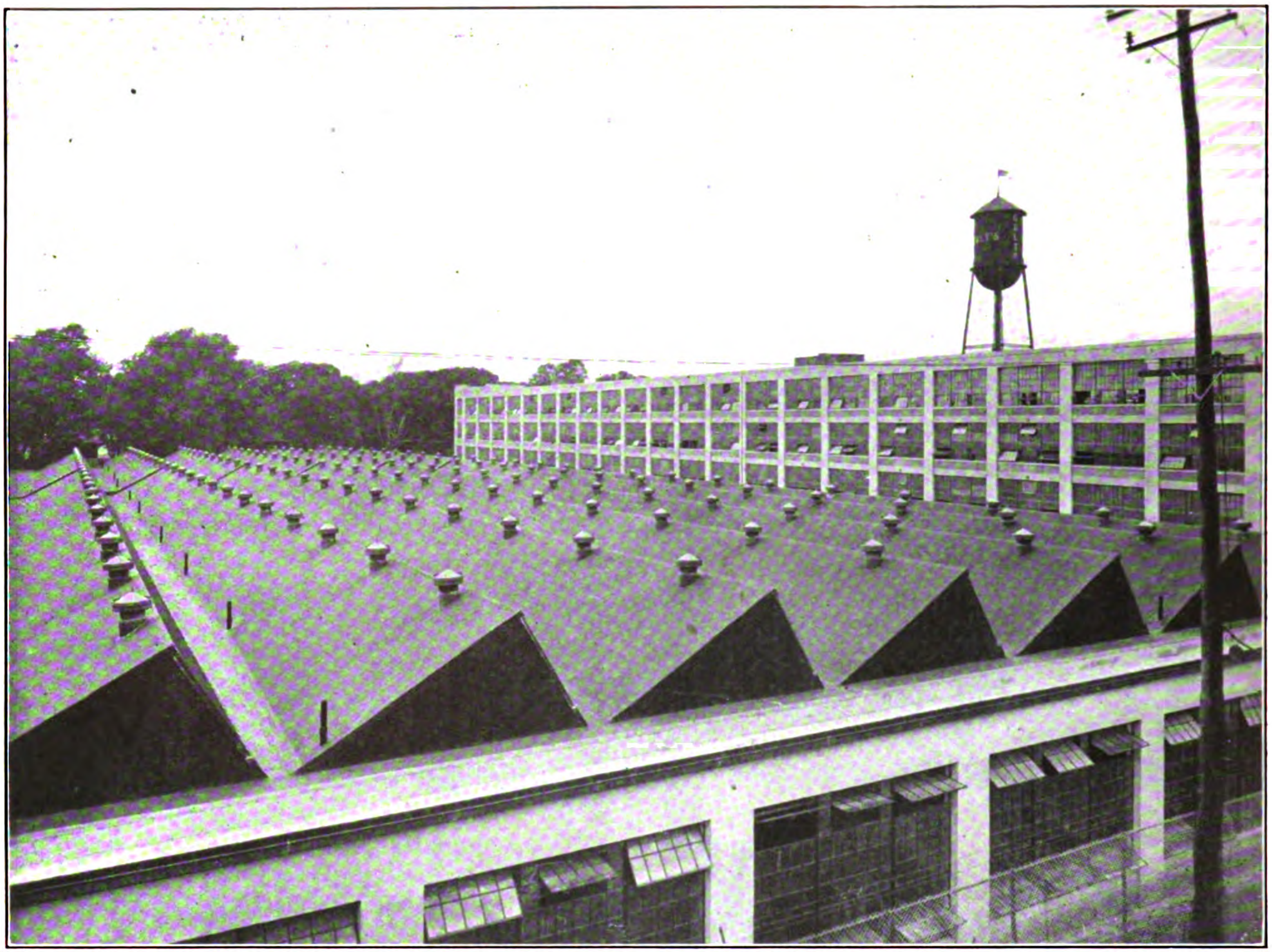

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CONSTRUCTION

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VOL. VI JUNE, 1918 No. 6

Building Activities After The War

ONE of the present problems of builders, contractors, architects, bankers and financial institutions interested in the building industry is to keep the nucleus of their organizations intact ready for the post-bellum period to start immediately on the great work of rehabilitation to meet the demands which will exist, owing to the long period of building inactivity in apartments, office buildings, factories, and loft space as well as waterfront developments, piers, docks, and warehouses.

All of these different interests have now become consolidated and centralized and are carrying on their work through the Building Industries of New York, which is an association of associations identified with the building industry so that the many different branches of the trade have become co-ordinated in their work of assisting the various departments of the Government.

While the association has been co-operating in every way possible in which it can serve toward winning the war, it is already planning for the almost equally important work of reconstruction, which bankers and practical economists state will require efforts equal to those of war.

The Department of Commerce of the United States has already issued two pamphlets showing the building material requirements of Latin American countries, and it has others in preparation. International construction interests, with headquarters in New York, already have their representatives in foreign countries, ready at a moment's notice to push forward in the work of world reconstruction when the war is ended, and when the United States will be expected to contribute most largely.

One of the officials of the War Industry Board states the following in "The Nation's Business," the journal of the Chamber of Commerce of the United States:

"In procuring the enormous quantities of materials and supplies needed in the war, and in the conversion of industry from non-war to war purposes, the Government needs and welcomes the active assistance and co-operation of business men, that it may have the benefit of their knowledge and experience to the fullest extent. If we are to have a strong industrial country after the war we must start now to put our industries in shape.

"Manufacturers with kindred interests, without infringement of existing laws, should consider problems of mutual concern. The aim should be to preserve the structure of each industry, not one manufacturer against another, one city against another, nor one State against another, but the industry itself, regardless of ownership or location.

"It is physically impossible for us in Washington to treat with each individual manufacturer in each line of industry. Valuable information concerning the industry as a whole is seldom obtainable from the individual manufacturer.

"The War Service Committee of each industry forms the best point of contact between the Government and the individual manufacturer, and can do much to assist the Government in its problems and at the same time to strengthen the industry itself."

Fire Protection for Piers and Docks

A SHORT time ago officials of the New York Fire Department ordered some two hundred owners and lessees of city piers and docks to adopt radical measures for insuring them further protection against fire. The list of requirements included fire curtains, automatic sprinklers, hand extinguishers, and like devices. It was estimated that the cost following the requirements would be several million dollars, and that five years would be necessary in point of time.

Protesting against the order in unmodified form the interested property-owners finally secured from the Department officials their promise to treat each case independently.

It was finally decided that the Fire Department officials should make such discriminations as would be warranted by the class of freight handled on such piers and docks. Piers that are located in close proximity to a fire department station or a fire boat, and the freight handled is not of a combustible or inflammable nature, will not be forced to make such improvements at once.

In other instances where the cargo is of a menacing character and the pier or dock is not properly protected from fire, the owner or lessee will be asked to make it safe. As respects the various Government-controlled piers, the matter is greatly complicated, but that does not interest the other owners and lessees. The whole matter will be taken before the Board of Review for adjustment. In commenting on the sudden vigilance on the part of the City Fire Department, an official of one of the large dock concerns said:

"I do not feel like censuring the City Fire Department officials, as it will be remembered that a few weeks ago there was some talk of the United States Government taking over the police and some other municipal departments as a matter of public protection. No doubt the sudden action on the part of the officials was actuated by this report. It would not be to the credit of the Fire Department efficiency to have the Federal Government step in and find that unnecessary hazards had been allowed to exist, especially on the water front. But we do not admit that there is any more danger now than there has been for years, and which condition has had the sanction of the Fire Department. However, there is not a pier owner or lessee in this port that does not want his property protected from fire, and will do all in his power to make it safe. Much of the so-called danger pointed out by the fire officials appears to have been far-fetched and looks as though it had been prompted by motives other than fire protection. The best proof of this is found in the fact that the records will show that pier fires have seldom spread beyond the pier on which the flames originated. About the only exception was the destruction of the North German Lloyd piers a few years ago. The flames are quickly subdued by fire boats and land fire apparatus."

"There is a great time coming in the building industry when the war ends, and the wise ones are making plans and preparations for it. Meantime there is a housing problem before the Government at crowded centers which is calling for more building material than many seem to be aware of."

Farsighted material men are alive to their opportunity and are systematically planning not only for present business, but for that to be had later.

Rapidity in Powder Plant Construction

A RECORD for speed in engineering and construction work has been set by the du Pont Engineering Company, of Wilmington, Del., in the recent completion of the largest smokeless plant in the United States.

The property, known as the "Old Hickory," and located near Nashville, Tenn., has a capacity for manufacturing 900,000 pounds of powder a day. The original contract entered into with the Government was entered into on January 29th last, and called for the completion of the plant by October 1st, the output to be 500,000 pounds of powder a day. A revised agreement called for completion of the work by August 1st. Such progress was made, however, that the contractors were able to beat this time limit by thirty days, almost doubling at the same time the production capacity of the property.

"The induction of the acid plant which took place several weeks ago will build up a sulphuric acid supply which will enable the nitric acid plant to start within a week. This, in turn, will give a supply of mixed acids which will enable the contractors to start the manufacture of guncotton by approximately the middle of June. The purification of cotton will be started in time to be ready when the acid is available and the actual manufacture of smokeless powder will follow in a few days thereafter.

"This plant is what is known as a self-sustaining plant, combining all the features of the Hopewell guncotton factory and the Kearney's Point smokeless powder factory. It is complete in all respects, using the following raw materials—sulphur and nitrate of soda for the manufacture of acids, cotton linters, lime, soda ash, alcohol, and a number of other ingredients. There are complete units for the manufacture of every ingredient that goes into smokeless powder as well as a diphenylamine plant of sufficient capacity to meet the requirements of both Old Hickory and the Government powder plant at Charleston, West Virginia. There will be a complete power plant for generating electric power and steam. This plant will have eight stacks, fifteen feet in diameter and 200 feet high.

"Each of the nine units is practically complete within itself and is approximately eight times the size of the largest smokeless powder plant in the United States, prior to the war. The entire plant is approximately seventy times the size of the largest smokeless powder plant in the United States prior to 1914.

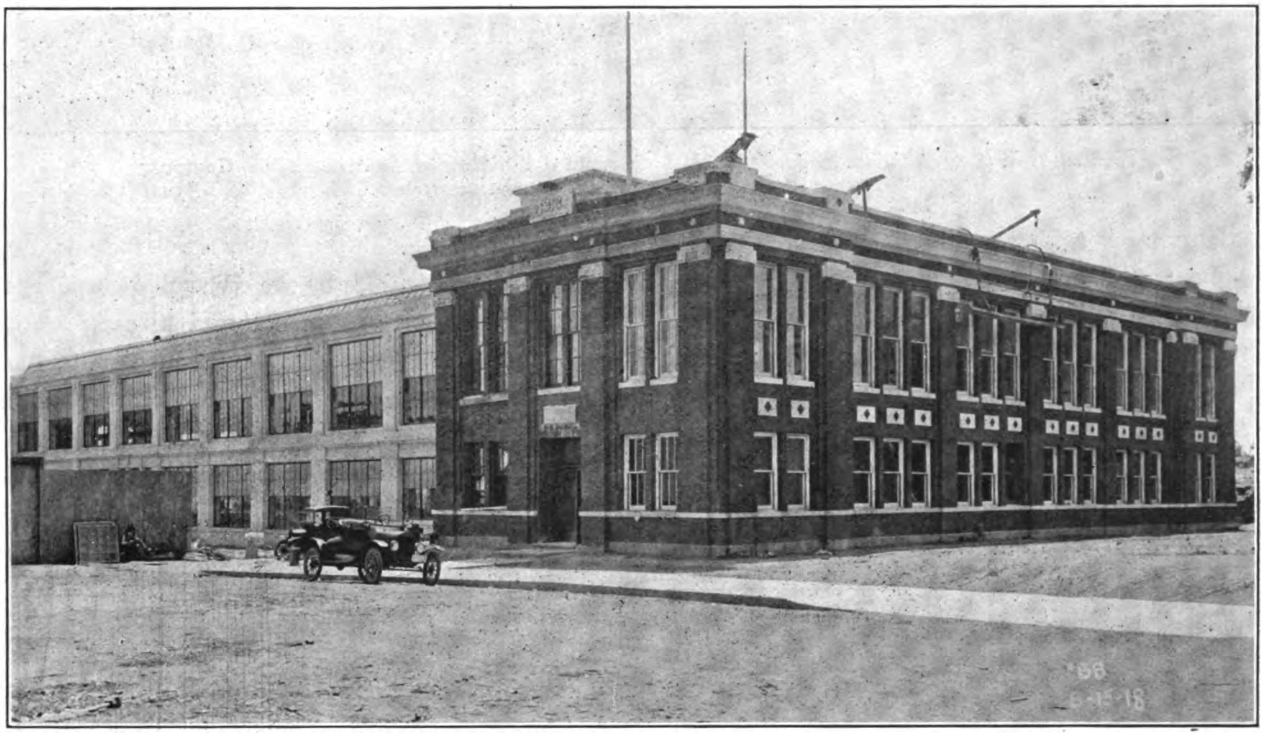
"The Old Hickory Plant including the town covers an area of about one and one-half miles wide by three miles long. It was necessary to build a town for the employes and this town will have a population of approximately 20,000 persons."

American Can Company's Latest Plant

ANOTHER notable example of the rapidity with which industrial buildings can be erected in this country when the need exists is afforded by the plant just completed at Newark, N. J., for the American Can Company, interior and exterior views of which are given herewith.

Designed to meet the peculiar needs of its owners, the new structure is a model workshop, being built throughout in a manner that will afford the maximum of comfort and convenience to employees, and thereby induce their maximum effort, and general content.

The office building, shown immediately below, is 40 feet, 8 inches wide, by 108 feet, 8 inches in length and two stories high. Its walls are reinforced concrete veneer with tapestry brick, and presents a pleasing prospect to the eye. In its conception the artistic and utilitarian ideas have been happily blended, neither being sacrificed to the dominance of the other.



Office Section of American Can Company's New Building at Newark, N. J.
American Concrete-Steel Company, General Contractors

The first floor is of cement, while the finish of the second floor is of composition, to fit the service it is subjected to. A view of a typical interior floor is afforded by the second illustration. Large window surfaces insure plenty of air and sunshine; indispensable conditions where satisfactory work is to be performed.

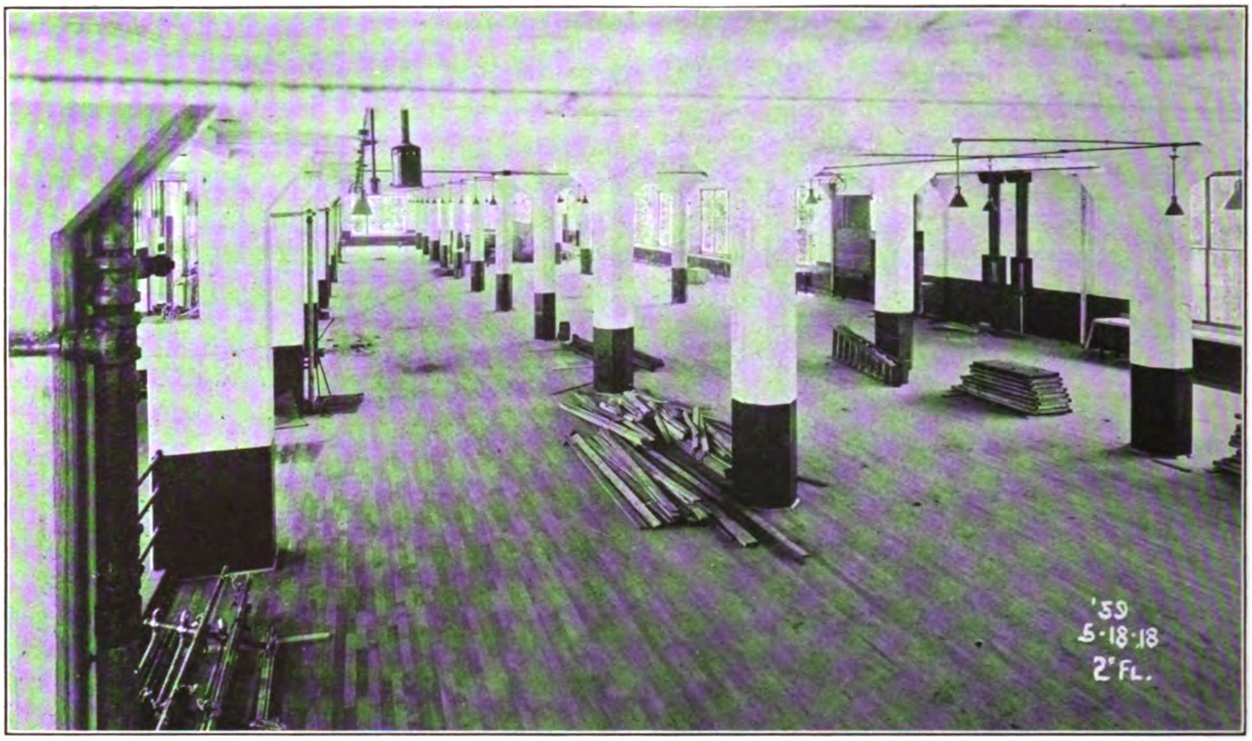
The exterior of the south side of the factory is shown in view No. 67. This section is 100 feet wide by 240 feet long and three stories in height, a projecting L furnishing large additional space and under equally favorable conditions with the main structure.

View No. 56 is of the erection shop, and deserves special examination. Forty feet wide this division is 240 feet in length, while the clear span is 40 feet at a height of 38 feet. A sawtooth roof over the shop is one of the special features that attests the completeness of the structure.

In the rear of the factory building is a forge shop extension, 40 feet by 100 feet. Each division of the plant is complete in itself, the whole so related as to eliminate waste, effort or time, and make for rapidity and thoroughness in production.

A study of the illustrations will disclose the peculiar merit of the elaborate cornices and belt courses, which are of reinforced concrete.

As might be assumed in so modern a plant elevator



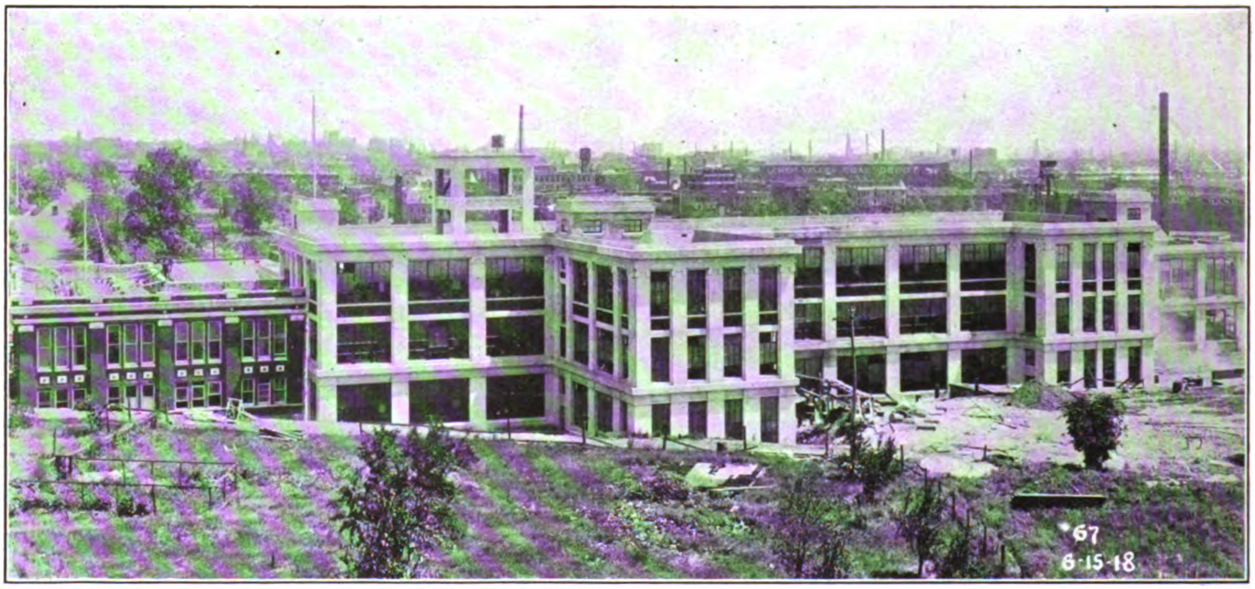
Typical Floor Construction in Newark, N. J., Industrial Building of American Can Company
American Concrete-Steel Company, General Contractors

fire doors and rolling steel shutters are installed throughout; the first named being of the approved Peelle pattern.

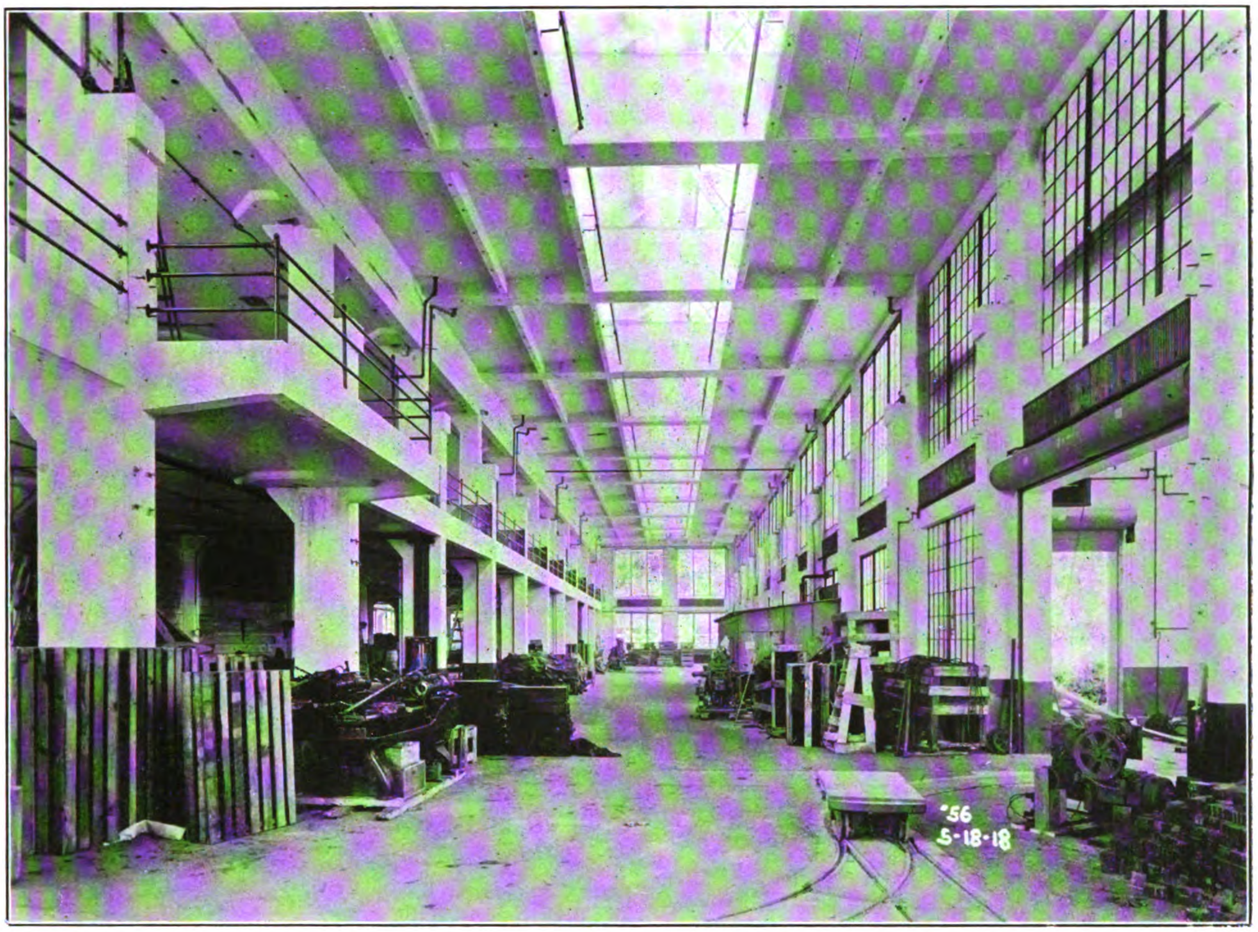
Creditable under any circumstances, the construction of the American Can Company's plant by the American Concrete-Steel Company of Newark, was especially noteworthy because of the hampering conditions surrounding its building.

The work of erection began on December 10th, 1917, and because of the pressing need for additional manufacturing facilities by the ownership corporation, the general contractors were forced to carry on the work during the unusually severe winter weather. To climatic conditions were added railroad embargoes, labor and material shortages, and the hundred and one unforeseen and unforeseeable contingencies incident to war upheavals.

Despite all these handicaps, and how severe they



View of South Side of American Can Company's Building at Newark, N. J.
American Concrete-Steel Company, General Contractors



Erection Shop in New Plant of American Can Company at Newark, N. J.
American Concrete-Steel Company, General Contractors

were, building contractors can best appreciate, the entire new plant was completed within three months, an achievement in which the American Concrete-Steel Company may well take pride, as the American Can Company does in this latest addition to its manufacturing properties.

If you cannot go to the Front, help
support the boys "Over There"
by buying War Savings Stamps

Government Buildings To Cost Over A Billion Dollars

SECRETARY of War Baker is authority for the statement that buildings for army use, which have been completed or contracted for to June 1st will cost close to $1,170,619,040: this exclusive of three operations costing $106,000,000 which are being conducted under the direct control of the Ordnance Department.

All work done under the direction of the construction division is performed under an emergency construction contract which is based on the cost of the work plus a percentage with an established maximum fee. By this contract no contractor can receive a fee of more than a quarter of a million dollars, no matter how great the total cost of the operation may be.

Up to June 1 the division had completed fifty-three jobs at a total cost of $202,250,000. It now has 244 operations under way which when finished will cost approximately $270,369,040. Preparations are being made to start work on 117 new operations which are expected to cost $700,000,000.

Of the finished jobs thirty-six were at cantonments and camps. The total cost for national army cantonments was $140,726,473. General contractors' fees were $4,000,000 or 2.84 per cent. of the total. From this amount the contractors had to meet all their overhead expenses of organization. The National Guard camps cost $38,375,272, on which the Government paid fees amounting to $2,636,534, or 6.98 per cent. of the total. In every case the contractors were compelled to meet the expenses of maintaining their organization from the fees collected from the Government.

Government in Full Control

The contract used by the construction division was devised after all accepted methods for contracting work had been examined. Under its provisions the Government has full control of all work. Its inspectors have the final decision on all matters. The Government retains the right to reject work which is unsatisfactory to it, and the cost of correcting all errors must be borne by the contractors from their fees. A complete check is kept on the payroll, and daily inspections, sometimes three a day, are made to see that all men on the payroll are working. Another check is kept on all materials used in the work. The Government pays rent for the use of the contractor's machinery, but in any case where the amount of rental totals the cost of the machinery it becomes the property of the Government. If at any time the Government wants to keep the machinery it can do so by paying the difference in the total amount of rental paid and the cost of the machinery.

A board of building experts was recently invited by the Government to examine the existing arrangement for letting work and to state whether the form in use is good or bad, and if bad to propose a new one. The board unanimously recommended the continuance of the present form of contract, under which the Government pays the actual cost of the work plus a fixed fee, out of which the contractor must finance the job, pay his general expenses and take his profit. In this contract, known as the "cost plus with sliding scale and fixed maximum fee," the fixed fees to the contractors range from 7 per cent. for contracts of $100,000 or less, to as low as 1¾ per cent. on very large contracts.

The fee is set when the contract is let, and if the cost of the work exceeds the estimate of the cost, due to high labor or material prices, the contractor receives no additional compensation. Labor and material prices are subject always to the approval of the representatives of the Government.

Principal Operations Underway

Some of the operations in prospect are: Storage terminals at Boston, Philadelphia, Charleston, S. C., and twenty-eight other points; signal corps cantonments and aviation fields; powder loading plants in suitable places and ordnance depots on the Atlantic Coast; housing for the Shipping Board at sixteen points; quartermaster warehouses at Columbus, Ohio; Albany, N. Y.; Middletown, Pa., and Buffalo, N. Y., and other points; aviation camps at forty points; ordnance storage depots at several points; a remount station at Charleston, S. C.; mechanical repair shops for troops of the regular army in Texas; three office buildings in Washington, in addition to those already under way; a hospital at Fort Riley, Kan.; an isolation hospital at Tenafly, N. J.; extensions at Springfield Arsenal, and gas making plants and gas shell filling plants at other points.

The construction division of the army, which is the outgrowth of the cantonment division, is now in charge of Colonel Richard C. Marshall, Jr., and is composed of about 5,000 persons. Approximately 700 officers are engaged. The majority of the latter are men from civil life experienced in construction work.

Should Be of Unusual Interest

BECAUSE of the extended use of concrete and reinforced concrete in the preparation for and the waging of war, the annual gathering of the American Concrete Institute to be held at Atlantic City, N. J., on June 25-28, should be of unusual interest, and it is to be hoped attendance at the gathering will exceed in number that at any previous convention.

The Architect in Industrial Building*

By Albert Kahn, Architect

I FEEL it a very distinct honor to have been asked by the President of the Institute to contribute a word to the deliberations of the Convention on a subject on which I have certain convictions, and about which there exists at the moment considerable speculation.

Our particular office is largely engaged in industrial work for a class of clients which, too often, employs the engineer or contracting engineers, virtually contractors, who prepare their own plans. This fact then, perhaps, qualifies me to call attention to certain points of which the profession at large must take cognizance if industrial work is to be done more generally by architects.

The war, of course, has brought the matter to our particular attention. General building work has practically come to a standstill and must necessarily remain so while the Government needs every bit of energy expended on war work. Only Government work and buildings for concerns doing war work are being constructed, and since so much of this has been, and is being entrusted to large contracting firms, the question very logically, arises, why? And then the further question, what is to be done to alter the situation?

The war has acted like an electrical storm in clearing the atmosphere surrounding the practice of architecture, and in revealing the architect's position in the commonwealth. That it is not altogether what it should be is very evident and that remedies to correct the situation must be found is equally apparent.

Primarily the past generation has been a period of tremendous industrial activity. Science has been pressed into practical service and has become the hand-maid of our daily life. New forces and new machines now at our command were unheard of three decades ago. Structural steel, sanitary plumbing, modern heating and lighting, and reinforced concrete were unknown a generation ago. These developments must obviously exert their influence on building. But while the busy world was perfecting one invention upon another, architects, as a class, failed to heed the trend of the times. Only grudgingly would they allow the utilitarian to enter into the building program. Modern ideas were all right if they did not trespass upon artistic concepts. Modern requirements had the unhappy habit of interfering with preconceived ideas of beauty. But the new methods were economically sound and practically sane, so they advanced under their own impetus, and if conservative architects would not adapt themselves to new conditions, then another class must rise who would.

The impression prevailing in the minds of owners regarding architects in connection with industrial work has grown to be analogous to Mark Twain's comment on Christian Science when paraphrased, "If physicians," he says, "only knew more about Christian Science and Christian Science more about medicine, the chances are the patient would get well with either, provided he had a good nurse." And the paraphrase, "If architects only knew more about engineering, and engineers more about architecture, the chances are the owner would have a good building with either, provided he had a first-class contractor," is the general conviction among owners of industrial buildings.

Larger Recognition for Architecture

Just as I started to write this paper the March number of the "Architectural Forum" came to hand. You have read the several answers to the question put by the editor, "In what manner and by what means can the practice of architecture be developed in order to win larger recognition?" To me, practically all the answers seem far of the mark. The very remedies proposed by the majority are at the bottom of the misgivings concerning architects. I take it that in putting the question, the editor meant to ask, "Why are architects not more generally called upon to render service in this vast amount of industrial work under way?" For the question of proper recognition would scarcely enter were the work of a monumental character. Neither the Government nor the public would undertake such without the assistance of the architect. The most important work is quite generally now entrusted to the best men, and a very high quality of results obtains, for discrimination and appreciation have grown largely among the people. Architects have, therefore, very little to complain of in this field. They have proven their worth and have made themselves indispensable. And this is exactly what many have not done in the province of industrial work. When a company decides to build a bank or a board a library or an individual a fine residence, they call in the best architect they can find, but when a corporation or the Government decides to build a large industrial plant, they, too often, call in not the architect, but the engineer or the contractor.

Now gentlemen, one or several corporations doing this, might mean nothing. When, however, the practice grows to be general, make up your minds that the fault lies not with the corporation, but with the architects.

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*Address delivered at the Fifty-First Convention of the American Institute of Architects.

Architects Need to be Educated

To me the reason for the existing condition is simple. There is nothing mysterious or strange about it. Educational work among owners and propaganda are the remedies proposed by those answering in the "Forum." It is not the owners who must be educated, it is the architects themselves. And as for advertising, such never bore results unless the goods were delivered.

Put yourselves in the place of a man about to build a factory. Would you call upon the artistic superman, the ardent idealist who soars in the skies, discourses on beauty of design and everything else but practical requirements, or would you seek the man who would suggest a practical, common-sense layout to meet your requirements, the man who would look at the problem from your own standpoint, who would place himself, as it were, in your shoes, and strive to solve the problem with and for you? The answer is obvious. You would place your work with the man of sound understanding and sane judgment, rather than with the artist, even if real and not imaginary, as is so often the case. You would seek an organization composed of men competent and qualified to handle the project in its various phases of plan, design and engineering, both structural and mechanical. Now such organizations are not built in a day, but require time to bring together and perfect in team work.

That any one can do a good manufacturing building, and that it requires no particular skill, has been the general impression of the profession. The owners, however, know it to be quite different and no amount of propaganda will convince them otherwise. No more can the general house physician at one moment turn to surgery and achieve distinguished results, than can the architect to industrial work until he has devoted himself energetically to such work in all its complexities, and has therein gained experience.

Here is the situation in a nut shell. Industrial buildings must needs deal largely with practical requirements, structural design and mechanical equipment. To be sure, every owner prefers to have his building of good appearance, but this is only incidental. The plant must be economically designed. First and last, it must serve as an investment, not as a monument to the designer. And there is the rub. The very title "Architect" which implies the building of the beautiful, fills the owner with fear that more attention will be paid the exterior to decorative details, than to the many practical features so vastly more important in the problem. The engineer, little concerned with appearance, more interested in the construction and in the success of the mechanical installation, is therefore called in, and though his buildings are generally monotonous and uninteresting, manages to satisfy his client. But even he is often dispensed with and the contracting engineer is entrusted with the work of design, as well as the construction. Whatever the general opinion of the architectural profession regarding the contracting engineer, certain advantages which commend themselves to the owner must be obvious. The manufacturer naturally welcomes every idea which tends to assist him in simplifying his problems. If he can call in a construction company, which has on its staff competent architectural men, good engineers, capable building superintendents, and if the company has proven itself able to produce successful results economically, he naturally prefers to deal with one person, rather than a number. Efficiency is the watchword of the day. Directness of results, good business methods and speed in construction are the desired ends. Contracting firms have been more awake to the exigencies of the times than have most architects, wherefore their success. They have appreciated the value of concerted effort, of full co-operation and of proper co-ordination, wherefore they have won the favor of the owner at the expense of the architect. We know very well that in such an arrangement the owner is at the mercy of the contractor, that he is unprotected, that he doesn't know whether he is receiving full value for the money expended, but the owner is quite willing to take his chances on this. To decry the system then is useless. The whole problem must finally be a matter of "Survival of the fittest."

Question of Efficiency

There is just one way for the architectural profession to meet the situation, and that is by serving the owner better and more efficiently than do contractors. By planning better buildings, by working more assiduously, more interestedly, by designing more economically and by obtaining results more direct and more efficient than the contractor. If we can show buildings better arranged, better constructed, at less cost, and incidentally more attractive, if we can handle an operation in a business-like manner, expeditiously and without friction, shall we need to worry about lack of appreciation or recognition? Absolutely not. In just the measure that we are equipped and capable to handle the work we seek, in just that measure will it be entrusted to us.

Service, satisfaction at all costs, sustained interest in the work at hand, strict attention to the detailed requirements of the client, a quick grasp of his needs, a prompt acceptance of his viewpoint, and a sincere desire to co-operate and to solve his problem for and with him: these are what he expects. And yet, how often is the owner served otherwise, and his viewpoint entirely ignored. This not on industrial work alone.

It is only a short time since I visited—with several professors, the Biological buildings of various Universities. This in connection with a building of the kind we were to do. The one prime essential for such structure is light and a minimum of obstruction, for microscopic work. Practically every building we saw was either Collegiate Gothic or an adaptation of an Italian palace, with glass but sparingly used, and when the question was put to the professor in charge of the departments, "Why so little light?" his answer was invariably, "Well, our architect felt that more would ruin the appearance of the building." Now is this right? Is this living up to our duties as architects, or to the best traditions of the art? In our particular building we frankly accepted the situation. We built them what we felt they needed; a modern industrial building with a maximum of glass surface and a minimum of masonry. The building is being used today with the greatest satisfaction to the faculty. Now, if the best work in the study of the sciences is accomplished in a modern work shop, why force a museum upon the scientists? And yet, this is done only too often in practically every field of building.

This brings me to a point which so often makes for distrust of the architect—the eternal disposition of many to occupy a pedestal of exalted importance and superiority. It is their intent to make up by an air of profound wisdom for what they lack of actual knowledge. Educate the client is their cry, and while they are attempting to educate him in something he knows more about than they, some saner man rightfully walks away with the work. This attitude is particularly offensive to the builder of an industrial plant, who, as a rule, has definite ideas of what he wants.

Must Recognize Ideas of Owners

I have yet to find a single client unwilling to be advised, but in the proper manner, if you show him both that which he has in mind, and at the same time a better scheme, ten chances to one he will accept yours. But neglect to show him on paper his own ideas and submit merely yours, and you are doomed to failure. Psychology here plays an important part. No owner wants his pet ideas ignored, no matter how impossible. He feels himself entitled to their careful consideration and rightfully insists upon this. We must have the owner's confidence, and in no manner can this be won more fully at the outset than by proper attack of the problem.

Another point—how many architects keep abreast of the times? How long is it since reinforced concrete, for instance, has proven itself an invaluable building material? It was strange enough that its acceptance was at first so long delayed by architects in this country, but there are many even today who have their misgivings and prefer to advise the use of lumber instead. And what is the reason? This—that concrete must be carefully mixed if used. Are they not engaged for the very purpose of seeing to this? Just as well object to the use of steel for the riveting must be properly done if it is to stand up. It is not so long since that a firm I know had positively to be forced by the owner into using reinforced concrete, and then only acquiesced in order not to lose the commission. Now, is this thoughtful conservatism or is it deliberate neglect of the architect's duty toward his client, which duty requires that he keep advised of modern methods and improvements, and that he give his client the benefit of such knowledge? If the architects will not, can we blame the owners for employing others who will?

Action the Watchword

This is a technical age, an age of rapid advancement and achievement. Action is the watchword of the day. Utility must have recognition before beauty. And if architecture is to remain a living force, the expression of the spirit of the age, we, the architects, must express the demand of the times in our work.

If anything I have said has given the impression that beauty as such is to be ignored in building, I want to correct it. I believe as firmly as anyone in carefully studying the work for appearance, but beauty is a term not so easily defined. The beauty we recognize in the Greek temple fails to exist if the same temple with all its refinements be transferred to do duty as a brewery. Wherefore then, suitability is an important element in establishing what is beautiful. For which same reason then the admirable wall surfaces of Italian palaces transferred to this country to serve as factory buildings would spell failure artistically as well as practically. Each new problem must, of necessity, develop standards of beauty entirely its own. Those applying to one do not necessarily apply to another. We know the value of light and air and sunshine, and also know that to supply such is a first essential for the success of the industrial building. A building which adequately fails to provide this fails in beauty, no matter how fine its details. Fulfilment of practical requirements and beauty, however, are not imcompatible. Indeed they are closely allied.

And now a few words as to organization for service, the all important element in satisfying the client and equally important element in the architect's success. Old methods and systems have grown obsolete. The work of building has grown so complex in its many requirements that the one-man institution can no longer serve with satisfaction. With the many details involved today, no one individual can possibly know all of, or even a part of, our work. Therefore it requires besides planners, designers, structural engineers, heating and lighting and ventilating experts, competent outside superintendents, the necessary clerical force for business administration, and last but not least, the head to properly direct the entire group. All of these, however, form only one element of the properly organized office. A spirit of co-operation must exist as well as a full faith in the principles of an owner's rights and a complete devotion to his interests from the material dollars and cents point of view. Enthusiasm must prevail and there must be keen open-mindedness towards all things new and progressive, eagerness to keep abreast of the times, willingness to work hard, and above all else, a liberal amount of good, hard, sound common sense.

Team Work Versus Star Play

To keep alive to all things new is the one thing, the importance of which cannot be overestimated. How much is lost to many through their unwillingness to be shown. Often the most valuable advice can be obtained from experts connected with manufacturers of building materials. In place of freely accepting, however, the assistance so widely offered by men who have devoted a lifetime to the study of just one particular subject, they prefer to rely upon their own limited experience, and in their egotism thrust upon the owner results which, though their own, are often not the best or the most economical. The efficiently organized office draws upon all resources about it, profits by all information that is to be obtained, makes certain that the best expert knowledge wherever this is to be found, is secured, consults with whomever possible to bring about better results, and prides itself upon the final success achieved, rather than individual effort, on team work rather than star play.

Your president has asked me to say a word about our own organization: Through gradual growth we have succeeded in bringing together a number of men who have charge of the various departments, who are vested with authority and assume responsibility. We have striven, and I believe succeeded, in gaining the confidence of owners and their respect for our business judgment, fully as much as for our professional work. Our clients consult with us quite as freely about the value and purchase of property, the probable returns on the investment, about the proper site for their particular work with consideration of the help situation or railway service, ask our advice on the advisability of the venture and value our opinion on purely business subjects perhaps more than our ideas of building. We assist the owner in every way possible from the purchase of the land to the moving into the building and make it our aim to relieve him of the details. We make it our special business to keep him fully informed on the progress of the work and to take particular care not to incur extras for him without his knowledge and consent.

Reputation a Great Asset

By consistent effort, we have built up a reputation for accuracy for our estimates of cost to the degree where our clients never question them and proceed in full confidence that the work will not exceed these estimates. This we have found the one most valuable asset we possess. I cannot too strongly emphasize the importance of establishing a reputation for just this. We prefer our estimates of costs to be high rather than low.

We make it a point to be prompt in producing preliminary sketches and to speed the preparation of working plans and specifications to the utmost.

For the administrative part of our work, we have a complete organization of clerks, accountants and a thorough system of keeping track of the work, as well as the accounts. We exercise all possible care in awarding the preparing contracts. Try to be prompt in the issuance of certificates and the cleaning up of accounts at the completion of the work. We impress upon the contractor quite as much as the owner that we employ proper business methods and that, therefore, we expect the same of them.

For work in the fields, we have a staff of capable superintendents who daily report to us on special blanks. We insist on their being not fault finders, but of actual assistance in the execution of the work and do not countenance petty conflict. At best, the superintendent must give and take. A perfect set of plans and perfect specifications are pleasant to contemplate, but a rare achievement, wherefore adjustments must necessarily be made. We stand back of our superintendents and vest them with authority, though we make them understand that the contractor has his rights and if differences of opinion occur, we are the final arbiters.

Above all, we insist upon working harmoniously and without friction.

I fully realize that this is anything but a scientific paper. If, however, in this plain, perhaps reactionary talk, I have been able to point out one idea which will assist others seeking the solution of this particular problem, I shall have accomplished my purpose. The field of plan and design is rightfully the architects', not the engineers' nor the contractors', but noblesse oblige, and if we are to be leaders we must measure up to our responsibilities. The future promises the greatest building era in the history of the world.

The part architects shall play in the field of industrial building rests with themselves entirely. To them will be assigned the work they are best fitted to do and more than that they have no right to expect. It will, therefore, behoove us to grow up to our opportunities.

Teaching Fire Protection in Architectural Schools

THAT those who have reached the top of the ladder in the architectural profession have no lack of enthusiasm for the study of fire protection has been made manifest by the activities of the Committee on Fire Prevention of the American Institute of Architects, the attention given to the subject in the Structural Service Department of the Journal of the Institute, and the devoted service rendered by distinguished members of the Institute, both as officers and members of committees of the N. F. P. A. It was not, however, apparent to what extent the importance of keeping fire hazards and their elimination always in mind was being impressed upon the students in the architectural schools; and for the purpose of obtaining information on this point inquiries were addressed to the eleven architectural schools whose graduates are accepted without further examination by the American Institute. A summary of the replies received is given below:

University of California. A course on fireproofing is given in the department of civil engineering. This course covers "the resistance of building materials to fire; fire-resistive and slow-burning construction; fire extinguishing equipment; corrosion and preservation of structural metal." Many of our readers will recollect that a more detailed account of this "Fireproofing Course" was published in the "Quarterly" of July, 1914 (Vol. VIII, No. 1, page 19), to which reference may profitably be made in this connection.

Carnegie Institute of Technology, Pittsburgh. In connection with the courses in architectural construction, "instruction of a general nature as to methods of fireproofing in buildings" is given to the students. There are no separate courses on the subject of fire protection and prevention.

Columbia University. Information on the subject of fire protection and prevention is given in a course in building materials and construction required of all students during their second year. The instruction includes: (1) "An explanation of how ordinary non-fireproof buildings may be made safer against fire by the use of beam filling, fire stops in partitions, approved methods of framing around fireplaces, chimneys, flues, etc." (2) "An explanation of the principles of slow burning or mill construction and their application to domestic architecture." (3) "An explanation of the different methods of making construction fireproof by the use of terra cotta, hollow tile, reinforced concrete, etc., the advantages and disadvantages of each and under what circumstances each should be used."

Cornell University. Prior to 1900 instruction in fire prevention and fire protection was given as part of the courses in general construction. In that year the courses were reorganized and one of them designated as "Steel Construction and Fireproofing." Further subdivisions have since been made, and for a number of years one course of fifteen or sixteen lectures has been "wholly devoted to the question of fire-resisting design and fire protection." The teachers of architectural design, structural design and structural details are all sympathetic, and it is believed that fairly good care is taken of the fire protection aspects in all departments.

Harvard University. In the course on "Materials and Methods of Building Construction," attention is given to the following among other subjects: Structural terra cotta, slow-burning construction, fire losses and precautions to be taken in planning and arrangement of a building for safety to life and property, fire-stopping, terra cotta floor arches, terra cotta and gypsum block partitions, reinforced concrete, fire-resisting finish and fire protection equipment, besides incidental mention of the effect of fire on various materials when considering them. "On trips to buildings, the students' attention is called to matters of fireproofing, and important fires are commented upon as they occur."

University of Illinois. There is "no thoroughly well-defined course in fireproofing," but this subject has recently been incorporated in one of the regular courses, and about six weeks devoted to it. In this work the endeavor is made to "point out the necessity of ample fire protection for structural features of the building" by the use of the Building Code of the National Board of Fire Underwriters and certain city ordinances indicating the minimum requirements along this line. Each year the seniors of the Department of Architecture are taken on a visit of instruction to the Underwriters' Laboratories. The preparation of a course "which will deal with the subject of fire protection in a very thorough manner" is under consideration.

University of Michigan. Fire prevention and protection are taken up in connection with the courses in building construction, "in which connection a great deal of information regarding these subjects is given the students." "Lantern slides of buildings which have burned are used to show actual effect of fire. Depreciation of buildings from other causes is also gone into."

University of Pennsylvania. All candidates for a degree are required to take "a course of lectures given one hour a week for one year on the materials and methods of masonry construction. This course includes a chapter on Fireproof Construction in Building." "The attention of the students is often called to the subject of fire protection and fire prevention in connection with some of their other courses." The matter also receives notice in a fourth-year optional course in architectural engineering.

Syracuse University. There are "no organized courses as such on fire protection and prevention," but these subjects are included, as far as possible, in other courses.

Massachusetts Institute of Technology. No definite course is given to the students on fire protection. "They have more or less instruction in this subject, however, in the course in Office Practice and in the course in Constructive Design." An occasional special lecture has also been delivered by a member of the Faculty dealing directly with fire protection.

Washington University, St. Louis. At the time inquiry was made the course in Materials and Construction was being entirely re-outlined. The first part of the course was "essentially devoted to the study of materials," and the second part "to their application in construction." The instructor put "a great deal of stress upon fireproof materials," and intended to devote several lectures to the subject of fire protection.—Quarterly of the National Fire Protection Association.

Hugo Delfs, head of the Lansing fire department, is the latest of the fire chiefs to publicly express his views upon the wood shingle roof menace. In an address before the Michigan Local Agents Association on the 19th inst. Chief Delfs emphasized anew the seriousness of the shingle hazard, strongly recommending the abolishment of the incombustible roof covering, and the enforced use of fire retarding material in such connection.

Cincinnati, Ohio, has been added to the list of municipalities in this country enacting a statute holding personally liable owners for all loss caused by fires originating upon their property, unless the fire was shown to be due to purely unforeseen conditions.

The surest way to escape liability in such connection is to erect firesafe buildings.

A valuable aid in the fight against the Huns is a sprinkler protected plant.

Alteration and Repair Work

WITH the practical cessation of new general building construction throughout the country aside from such structures as are required for the direct or indirect prosecution of the war, such activity as now exists in building lines, is mainly upon repair and alteration work.

Property-owners unwilling to invest in large building operations through financial considerations or inability to secure the needed materials within reasonable periods, have yet been induced to make substantial alterations to existing structures, greatly to the improvement of the properties and with profit to their owners.

Under the guidance of capable architects it is possible to completely transform antiquated and unattractive buildings to conveniently arranged and pleasing looking properties. And at very modest financial outlay.

Builders and real estate men in their own interest and that of their respective communities would find a profitable field in seeking out time-worn structures and inducing their owners to modernize such properties.

Good Argument for Incombustible Roofs

Col. James R. Young, insurance commissioner of North Carolina, is a persistent and logical advocate of fire safety in building construction. His latest expressed views upon the subject are as here given:

"The Actuarial Boards show that $7,355,047 were lost in 1916 by sparks on roofs. Rather a good argument for non-combustible roofs. Is it not?

"How about North Carolina? According to her regular proportion of fire losses, the fires in North Carolina from sparks on roofs should have been $95,615, but they amounted to $143,533—an increase of two-thirds.

"Who can say that we do not need to work for non-combustible roofs in North Carolina? Let the good work for anti-shingle roof ordinances go on. We have everything to gain and nothing to lose."

The appeal of builders and building material manufacturers for greater consideration of their interests by officials of the Federal Government is apparently bearing fruit. Secretary McAdoo and his associates recognizing that if the prosperity of the country is to continue, facilities for business building must be allowed. From now on there should be a steady increase in construction work throughout the entire field.

Opportunities for the Rural Contractor

DIFFERENT conditions, all or nearly all of which have arisen from our entrance into the war, have been responsible for a slackening of general building activities. Naturally some of this slackening has been because of war's demands on commonly used structural materials, such as steel and wood. Does the rural concrete contractor realize, however, that these seemingly adverse conditions are really favorable to him?

If there is one best selling argument for concrete, it is that materials that otherwise would be waste products are put to useful constructive ends. There is nothing consuming about concrete construction. It represents the true conservation idea that should be and is in perfect harmony with our present national aims. Even cement is made of what would otherwise be a useless material, and the bulk of the materials of concrete are sand and pebbles or broken stone, which also lie useless in the pit until put to the permanent constructive ends which they reach in any concrete structure. The materials of concrete being found almost everywhere, building projects planned for concrete represent the use of local materials; thus the already overburdened railroads are not still further taxed when their every effort is needed to meet the demands of war.

Do all rural contractors realize in fullest measure the meaning of the above statements? If they do, they will find their promotive efforts meeting least resistance in putting over contracts during the coming year for the many and various buildings that will be needed in every rural community. We are urged toward conservation in every way; also toward greater production; but greater production may avail little if staple products of the soil, for instance, are not properly housed until they can be shipped to consuming centers.

Waste of foodstuffs through the depredations of fire and rats is enormous. Concrete builds out both fire and rats. Every available resource must be conserved. In the building line no material so fully fits the conservation scheme as concrete. We believe it is going to be a year of building in the rural communities, and in the small towns. Conditions will fortunately force a greater favor for concrete than that material has ever before known.

Is the rural contractor awake to these latent opportunities? The town needs a small public garage. The local coal dealer needs fireproof bins for coal storage to in every way safeguard this fuel against fire. The local grain dealer needs concrete grain bins to conserve against fire and rats. Many a farmer needs a concrete machine shed because he is going to increase his mechanical equipment this year to make the lessened farm labor more efficient and thus to help save man power needed by the Government.

Many of the small buildings that the rural community requires should, for every reason which we so well know, be of concrete. Neither labor nor materials will have to be transported by rail. Design for such buildings as have been mentioned above can be so largely standardized that any skilled contractor can deliver buildings fully 100 per cent. efficient. Concrete can be used for most of the structures mentioned either in the form of block or monolithic construction. Fruit and vegetable growing centers need storage caves or warehouses, in the construction of which no other material than concrete should enter. The local garage, whether public or private, needs safeguarding against fire from without and should safeguard adjacent structures by being built of fireproof material. Such a building can often be made to serve a double purpose. If two stories are planned, the upper one can appropriately be fitted up for local club or lodge use. Warehouses, power houses, coal bins or pockets, all demand concrete construction because the business involved needs safeguards which concrete insures.

Here and there the argument is advanced that prices of materials have risen to such a point that the wisdom of building now is to be questioned; but we are in an era of high prices and those best fitted to judge by comparison with past times, are of the opinion that the prices of two or three years ago will never again prevail. As a matter of fact, cement, which constitutes only a relatively small volume of the total materials required in concrete construction, has advanced in price less than other building materials.

Farmers are prospering beyond their wildest dreams. They are cashing in on big crops, and if reports may be relied upon, the acreage planted this year will greatly exceed that of last year, and with no greater average production per acre should result in still more

stupendous crops, with corresponding returns to invest in farm buildings or what not. The average rise in price of building materials has amounted to less than 30 per cent. The rise in price of farm and many manufactured products has been from 100 to 300 per cent. or more. With the same quantity of wheat, corn, oats, etc., as before the war, the farmer can build two houses, two barns, two corncribs, two of any kind of building that he may want. Instead of going down, prices are more likely to go up. Building is cheaper now than ever.

The average structure is four walls and a roof. There may be one or more floors. Standardization of concrete design where nothing ornate is desired is so possible that the contractor need be only a builder. Engineers have worked out slab and column design for different loads and spans. It is merely necessary to adapt established standards to the need of a particular business to be housed. Such standard tables with respect to residences, for instance, and some types of commercial buildings have been arranged in handy chart form by the Portland Cement Association and can be obtained by those interested without charge or other obligation.

The Alpha Portland Cement Company has a series of service sheets giving good ideas for the construction of more than a score of rural and other small or medium-sized concrete structures. These sheets are sent free to interested architects, contractors or property owners.

Now more than ever before is the time to get out and sell concrete on its many merits, but particularly the merit of conservation, which fits in so harmoniously with the Nation's needs to-day.

Pittsburgh Building Picking Up

LIKE in nearly all other cities in the United States building operations in the Pittsburgh district are light, says "Realty." While high cost is one reason, it is not the principal one. The greatest detriment is inability to get sufficient materials, and to get them promptly, and the labor shortage is also a serious problem. Yet even with these handicaps there is no doubt building would have been on a larger scale in Pittsburgh this Spring had it not been for the widespread impression that the Government had issued an embargo against building generally. That impression prevailed until late in April, when a delegation composed of members of the National Association of Builders Exchanges went to Washington to consult the Federal officials about the real status of the building industry. The delegation went up against the usual Government red tape, and found it so strong, that the delegates could not break through it. They were shuttled from one department to another without getting definitely anywhere, so finally, in disgust, they beat a retreat homeward.

All they obtained for their time, trouble and expense, was the assurance that as yet, or at least, up until then, the Government had not embargoed building in general. They learned that Uncle Sam does not frown on ordinary home construction, so long as it does not interfere with Government war activities, but that he does look with disfavor on the putting up of any big buildings that can be postponed until after the war. But the report that a general building embargo has been declared, although erroneous, has made most people fear that such an embargo may eventuate at any time, and rather than chance being caught with partially finished structures, most people prefer to forego building until conditions are nearer normal.

In Pittsburgh in April total building permits issued were but 343, representing work to cost $771,381. Of these totals 191 permits were for new buildings, to cost $577,418, compared with 223 new buildings to cost $750,656, in April, 1917. At present in Pittsburgh there are not a dozen dwellings in course of construction, and every day building projects of one kind and another, planned for early commencement, are being pigeon-holed because of all bids on the jobs being too high. But the outlook is not entirely hopeless. Some still have the courage to "carry on." The largest operations permitted in April were industrial and military in character. The Carnegie Institute of Technology took out a permit for barracks to cost $100,000, and for a mess hall, to cost $10,000, for the use of training soldiers located here, and several permits were granted for factory and mill buildings in which war supplies are to be made. S. Sampson also secured a permit for a $140,000 commercial garage, and a printing company secured a permit for a $50,000 commercial garage, and a printing clubhouse and post office building in the East End, to cost $120,000, was permitted. In the entire month permits were granted for only nine dwellings, the most costly one being a $10,000 structure.

Housing Problem at Philadelphia

THE magnitude of the housing problem has been thrown upon Philadelphia by the removal to that city of the Emergency Fleet Corporation headquarters and the evolution of Hog Island and other shipbuilding plants in contiguous territory around that section of the Delaware River is strikingly shown in a recent article on the subject in the "Public Ledger" by John Ihlder, secretary of the Philadelphia Housing Association.

As Mr. Ihlder sees it, it is really a broader issue than one for Philadelphia real estate and building men alone to handle, for it involves outlying districts and calls for no small measure of broad sociological consideration, if all the needs of the new population are to be met. As he sizes it up, the mere suggestion of building up a certain sectional colony of the city itself falls far short of the needs of the new populace.

"The unit concerned," he says, "is the whole Philadelphia district from Trenton to Wilmington and including the New Jersey shore of the Delaware. This area comprises the most important single sector in our so-called second line of defense, and for production purposes, from the point of view of the war programme, it is or should be one administrative area.

"After the war is over its various parts will have become so interrelated that it will continue to be a single area for all purposes except political, and political unity must follow as far and as fast as practicable. Certainly all of this area which lies within Pennsylvania must come under one administration, so that we may develop adequate systems of transportation, roads and streets, sewers and water supply. For the parts that lie in New Jersey and Delaware we shall have to work out a co-operative administrative arrangement just as will New York and the cities of northeastern New Jersey.

Private Building at Standstill

"If enough houses were built in Philadelphia to shelter all the Hog Islanders they would meet only a fraction of the need, as the League Island Navy Yard, the new airplane factory, the arsenals and munition plants, as well as other shipyards, have brought and are bringing many thousands of workers to Philadelphia. Meanwhile private builders have virtually ceased operations. Up to May 1 this year, permits had been issued for only 390 dwellings, as compared with 1,697 in the same period last year, when high and fluctuating costs had already checked building, and 3,058 in the first four months of 1916.

"According to the Manual of Councils, Philadelphia had on January 1, 1918, 372,608 dwellings, of which 236,000 were of the two-story type. This is only 809 more dwellings than it had on January 1, 1917, according to the same authority. That is, while we were building 2,734 dwellings (the total of new dwellings in 1917) we apparently were demolishing 1,825. But these figures again do not tell the whole story, for there remain very many dwellings unfit for habitation. They range all the way from ruins to houses which could be made fit with comparatively small expenditure.

"During the last year, however, repairs and improvements have been neglected to an unusual degree because of the scarcity and high cost of labor and materials. So there has been an abnormal depreciation of existing dwellings.

"We cannot stop at the city boundaries. Chester is even more overcrowded than Philadelphia; a garage has been turned into a dormitory for 160 men; an old building houses seventy-eight men, twelve or more to a room, who have only a single yard toilet, a yard hydrant and a kitchen sink; an old moving-picture theatre has been converted into twenty-two apartments with one water supply; a family shares a stable with three horses. In Chester many families take in lodgers, and as there is no such housing law as that of Philadelphia, the overcrowding is in some cases almost unbelievable.

"In one three-room house there are father, mother, a daughter and five men lodgers; in a four-room house, father, mother, boy and girl and five men lodgers; in a five-room house, father, mother, five girls, five men lodgers and two women lodgers; in an eight-room house, mother, four boys, two girls, seven men lodgers and four women lodgers. Such instances may be indefinitely continued.

"Model Village" at Marcus Hook

"Outside of Chester, in the smaller communities, as Marcus Hook, which boasts a 'model village,' is an Italian colony, where twenty-four six-room houses contain an average of 11.96 persons per house and one eight-room house contains twenty-two persons.

"It is because no more people can find shelter in these outlying communities that so many journey back and forth to Philadelphia. Their problem is our problem, and it can be solved only by recognizing the fact. The first and greatest need is more houses. Scarcely second is the need of properly maintaining existing houses. To do these two things effectively we must see the work, not as unrelated fragments, but as parts of one whole.

"Before we entered the war some of our largest plants moved to the outskirts, the Baldwins built their new factory as far away as Eddystone, the Remington

Arms Company and the Eddystone Munition Works chose neighboring sites, the Westinghouse Company located somewhat nearer the city. Then with our entrance into the war shipbuilding was developed. Old yards like the Cramps, younger ones like the New York, in Camden, were expanded. In Chester, Gloucester, Bristol and Wilmington new yards were built, old yards expanded, abandoned yards revived.

"Then the Hog Island yard was started just across the Philadelphia boundary line. Not one of these was a local enterprise in the old sense, every one being affected by its relation to Philadelphia. Not one of the outlying towns or cities could house the men its plants employed. Early in the fall Gloucester and Camden were filled, and one yard alone sent hundreds of men to Philadelphia every night. From Chester there now come at least 15,000 employes daily to sleep in Philadelphia; there are thirteen trains that simply shuttle back and forth between the Baldwin and Remington plants and Philadelphia.

"These employes who are being carried back and forth over long distances should be housed near the works; if possible, within walking distance. The money spent in transportation is largely wasted. To this must be added the waste of time and strength, for some of these people start soon after 5 o'clock in the morning and do not get home again until 7 o'clock at night. And this at a time when rolling stock is scarce and railroads so congested that we are urged to travel no more than is necessary.

"The Shipping Board sees the problem more nearly in true perspective than do we, perhaps, because its eye is further away from the penny. To it the Hog Island development, big and important as it is, is only one of many. It proposes to build approximately 1,000 houses in Camden, 1,000 near Chester, about 500 in Wilmington, some at Bristol. In addition, the Sun Shipbuilding Company at Chester has erected and has in course of erection 350 houses. These developments are all, with the possible exception of that at Wilmington, of as great interest to Philadelphia as a development in the Fortieth Ward, as they will somewhat lessen the increase of pressure of population here.

"In this connection a clear distinction should be drawn between the different groups of people to be housed. The Emergency Fleet Corporation's removal of its headquarters to Philadelphia will bring in a different group which will find comparatively little difficulty in finding shelter, especially during the summer. There is not a great choice of desirable houses renting for from $50 to $75 and up per month, but there probably are enough to meet the need, and the newcomer cannot be too particular. There are also many furnished rooms to rent for the office staff. The problem remains as it has been—to provide sanitary dwellings for the wage-earner."

Fire Hazards in Public School Buildings

IN a recent number of CONSTRUCTION we noted the comment of H. N. Kendall, Commissioner of Education of New Jersey, regarding the inflammable nature of many of the public school buildings of that state, and urging a more vigorous effort to insure the fire safety of such structures.

Under date of May 21st Commissioner Kendall's office issued another communication upon the subject. From this letter we quote in part as follows:

"There remain a large number of buildings containing fire hazards which should be given attention before the opening of the schools in September 1918.

"Compared with the safety of children housed in these buildings during school hours, there is no excuse for the failure to erect proper fire escapes, install proper smoke doors and fireproof over and around furnaces.

"The big majority of buildings reported to this office as containing fire hazards three years ago, have been made reasonably safe for the quick exit of pupils housed therein, but the remaining unsafe buildings, if not properly safeguarded both as to means of quick exit and prevention from fire, must be given attention this summer, and the commissioner asks the co-operation of every Board of Education having under its supervision and control a building containing fire hazards, in seeing that said fire hazards are eliminated."

Present laws in New Jersey compel the use of fire retardant materials in building construction and such properties as have been erected since 1916 are largely of a desirable type, from a fire resisting standpoint. The hazards to which Commissioner Kendall refers in his most recent letter, exist in the older buildings of the state, properties that were erected when little or no thought was given to the fire menace, and it was not until the frequency and seriousness of school house fires could no longer be ignored, that a modernized building code was adopted in the commonwealth.

Prevent Fires During Construction Period

CONTRACTORS engaged in building operations, and especially upon plants intended for the production of war materials, are strongly urged both from a patriotic and a selfish standpoint, to be vigilant in guarding against the fire danger.

It is recognized that the use of many materials and devices in construction and equipment increase the menace from fire at this time, hence, the special warning from fire prevention officials for builders to keep unusually alert.

Building With Metal Lumber

By A. H. Bromley, Jr., Canton, Ohio.

METAL lumber is found forging to the front among the systems of construction available to meet the "need of the hour," namely, fire-resisting, sanitary and economical homes. The materials required to construct these houses should be products not in demand by the Government for armament, ammunition, or ship-building. These conditions are met by the use of pressed steel in the gauges used for the fabrication of metal lumber and the lighter gauges used for metal lath; also in the concrete and wall materials which involve the use of Portland cement, sand and gravel or broken stone, all of which are among the most available and widely distributed materials used in the building business.

Economy is secured by this method as both the "weight-bearing" metal lumber and the fire-resisting concrete and mortar are used in minimum quantity because of the scientific design and proportioning of the materials of construction. Every ounce of material is in active service, and being used for the purpose for which it is best fitted.

Advantages of the Construction

Metal lumber consists of pressed steel studs and joists, which make it possible to construct fire-resisting and vermin-proof walls, partitions and floors with minimum of materials and utmost speed in erection. The application of metal laths, which entirely encase the metal lumber frame and joists, serves to stiffen the structure. This forms, with the concrete floor fill, plastering and stucco, a building which is practically a unit and perfectly rigid, and with the decided advantage of being warm in winter and cool in summer.

This type of construction does not furnish merely a fire-resistive exterior wall or shell such as would be afforded by masonry walls and wood interior construction, but also serves to prevent the partitions from acting as flues in conducting fire from one floor to another.

An extensive practical investigation is being carried out by the Bureau of Standards of the United States Government on the permanency of the commonly used types of stucco of various types of mixture on various bases. The test comprises 56 panels, each 10 x 15 feet, each panel containing a window or door. Nineteen of these panels include the use of metal lath. The four metal lath panels comprising Group 3, constructed with metal lath attached to studs without sheathing and lath back-plastered has practically the full rating given reinforced concrete and brick walls, upon which basis all comparisons are made.

A feature worthy of note in connection with this type of construction is the ease with which variation can be secured in the exterior details, such as window heads and sills, together with ornamental effects, such as bands or brackets.

An inspection of the design of these houses indicates, first: a structure composed of pressed steel sections, scientifically designed, and based on the use of steel of special analysis and heat treatment, to give greatest structural strength, permanence and elimination of internal stresses; second, the elimination in the walls and partition construction of inflammable material.

The floor construction in this type of house consists of pressed steel I-joists, spaced to afford maximum economy with proper construction. The wood finish floor is readily and rigidly secured to the upper part of the joists by means of 2 in. x 2 in. wooden nailers or sleepers, which are secured to the joists by nails being driven between the two channel sections forming the I-joists. Between these 2 in. x 2 in. nailers and resting on the projecting shoulders of the upper flange of the I-joists is a 1¾ in. reinforced concrete fire-resisting slab. This slab, in addition to the ceiling plastering (which is also applied on metal lath), serves as a protection to the structure. The walls and partitions as designed are likewise adequately protected by the cement stucco on the exterior and the plastering on the interior of the building.

Material of this nature is furnished with each member identified by marks, and accompanied by complete erection diagrams. When it is considered that the building consists entirely of "one-man material," wherein no heavy equipment is required for handling or erection, the construction method is particularly attractive at this time where the question of the conservation of labor is a vital issue.

War Saving Stamps Should
Appeal to Good Americans as a
Desirable Form of Investment

A Department Devoted to the Use of

AUTOMATIC SPRINKLERS

Edited

IRA G. HOAGLAND, Secretary **PAUL MASON, Special Representative**
National Automatic Sprinkler Association

Automatic Sprinkler Efficiency in Department Stores

THERE is a department store in Columbus, Ohio, of very ordinary construction, that originally consisted of two old four-story buildings that were thrown into one by the simple process of cutting numerous large openings through the dividing walls on all floors. Basements were similarly thrown into one. In after years, when the business had grown beyond the capacity of the buildings, two stories were added over both, with areas unbroken by walls of any kind. Elevators serving all floors from the basement up are in iron grille enclosures, with no attempt to make them fire-resistant.

When the two top stories were added, the establishment was completely sprinklered, with standard equipment; and thereby hangs an illuminating tale of safety from fire.

One night about 14 months ago fire broke out in the basement at the foot of one of the elevators. No one knows what caused it; but it could not have started at a spot more advantageous for a complete sweep through one of the most hazardous mercantile buildings in the heart of the Ohio capital.

Sprinkler on the Job

But a sprinkler head was on the job. It opened promptly, extinguished the blaze, and when the fire department reached the scene a few drowned ashes were floating off over the basement floor.

"That one sprinkler head," said Battalion Chief John A. Welsh to the Ohio Firemen's convention a month later, "saved us from half-a-million dollars of loss."

In the fall of 1915 fire broke out in bales of excelsior in the basement, just about the center of the huge Bon Marche department store at Seattle, Wash. The night watchman smelled smoke, but it required some time to find the point of origin, and when he did, he discovered that one sprinkler had opened and extinguished the blaze. The significance of this lies in the fact that the Bon Marche store occupies four 4 to 6-story and basement adjoining and community buildings, covering the greater part of a city block, fronting on four streets, with more than 250,000 sq. ft. of floor space and 70 per cent. of it of quick burning construction.

Battalion Chief Clark, who responded to the alarm, said of the incident:

"If automatic sprinklers hadn't been installed, I hate to contemplate the ruin we might have been facing on one of our busiest corners this morning."

Very Hazardous Class

There is a multiplicity of these instances in the record of fires in sprinklered department stores. And it must be remembered that the average department store is a hazardous risk—hazardous in both building and contents. There is no discounting the combustible nature of the contents, which in addition are peculiarly susceptible to smoke and water damage.

Moreover, the average department store is like Topsy, in that it "jest growed." Very few department stores leap into full being at the beginning. A dry-goods store adds a millinery department and a shoe department, and as the business grows, the store expands by the simple process of attaching an adjoining building to it and cutting unprotected (and usually large) openings through the walls. This process is repeated up to the limit, resulting in a hodge-podge of community buildings of various types of construction (usually hazardous), and then, when the limits of lateral expansion have been reached, top stories, up to the limit of structural stability, are superposed on two or more of the constituent buildings.

Augmenting the Hazards

The hazards of such establishments are manifold—structurally, and occupationally. Construction, as pointed out, usually has all the hazardous features of the older types. Areas—themselves large and unbroken—are made still more menacing by cutting openings through dividing walls and—as a rule—leaving them unprotected. In many instances large sections of walls are removed, and frequently entire walls are eliminated on individual floors. This condition, coupled with unprotected stair wells and elevator shafts and the high combustibility of contents, assures the rapid spread of fire throughout the building, once it starts.

Structural stability also is seriously menaced by the system followed in making enlargements. Little attention is given to the safety factor in bearing walls, once the department store management decides that it is necessary to throw floors of adjoining buildings together or to provide readier access by the cutting of doorways or arches. Walls frequently are replaced by unprotected columns, in the fond hope that they will bear the weight carried on the floors above. As a rule they will, so long as there is no fire; but unprotected columns furnish little, in time of fire, except assurance that they will buckle when subjected to high temperature and allow upper floors to come crashing down.

This is an argument for better construction and sounder methods of structural maintenance; and undoubtedly department stores, like all other forms of mercantile and industrial activity, should be housed in the most fire-resistant buildings possible. But department stores are largely in buildings other than safe, or even fire-resistant—and the problem is one of protecting them as they are, and not as they should be.

Sprinklers Solve the Problem

The solution of this problem is found in the automatic sprinkler.

Specific evidence of this fact is found in the two instances cited and might be multiplied almost indefinitely from the record of fires in sprinklered department stores. These two citations, however, are sufficient to indicate the efficacy of sprinkler protection under the most disadvantageous conditions; and the conclusion reached—of safety under the sprinkler head for establishments of this kind—is borne out in the statistical record of fires in sprinklered risks, collated and published yearly by the National Fire Protection Association.

This record, for 21 years to March 31, 1918, shows that of 364 fires, there was satisfactory control in 353, or 97 per cent., and unsatisfactory control in only 11, or 3 per cent. This is a better record than for the entire list of occupancies—140 in all—in which the percentage of satisfactory controls for 21 years was 95.55 and of unsatisfactory controls 4.45.

Analyzing the cases of unsatisfactory control in the department store class, it is shown that in 4 instances water had been shut off; in 3, defective equipment or unsprinklered portions were the determining factor; in 2, conflagration or exposure operated, and of the other 2, one was due to obstruction to distribution and one was not classified. It is clear, therefore that in 8 of the 11 instances, or 72.8 per cent., human dereliction was responsible for the unsatisfactory nature of the control. There is thus indicated a potential sprinkler efficiency in this hazardous class of 99.45 per cent., a very small proportion of which is nullified by the intervention of the human element.

War Work Buildings Should Be Fireproof

THOSE who have followed the erection of war work buildings are amazed at the inflammable character of many of the properties and cannot appreciate why such construction has been permitted. The necessity for speed is not a proper answer to the inquiry for it is far easier just now to secure masonry materials and mechanics skilled in their use, than it is to get lumber and carpenters, the latter being in great demand at all Government shipbuilding plants.

Commenting upon this general subject "Modern Building" says:

"Reinforced concrete and cement stucco afford an ideal fireproof construction which can be quickly and economically erected in any locality. Also in industrial buildings steel sash should be used for window openings. Steel sash now is a stock proposition and is therefore readily obtainable.

"Let us face the situation as it is and see that past mistakes are not duplicated. What is more, let us arrange to remodel many of the buildings already erected. The wood exterior building can readily be made fire-resisting by covering with metal lath and applying stucco. The concrete exterior provides great protection from conflagrations on the outside, and will in most cases save the contents of a building. Hundreds of our buildings at the cantonments, munition works, storehouses, etc., should be protected in this way. Now is a good time to go about this, because the labor and materials are readily obtainable. As we progress farther and farther into the war, more and more of our man power and materals will be used in the national service. It may be too late then to do the things that are readily possible now.

"As for the numerous new buildings that are being planned by our busy industries, and the many industrial housing projects that are under way, let us insist upon permanence and quality in construction. We cannot, as private individuals or a nation, afford to build buildings that can be destroyed over night, and which even at best depreciate rapidly. Fire-resisting construction quickly and economically built, should be the standard that is kept before us."

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Because fireproof building construction so long meant metal or concrete, many contracting carpenters are making no effort to get jobs which now rightfully belong to them. For Johns-Manville Transite Asbestos Wood—fireproof and weatherproof—is essentially a carpenter's material.

To be used in place of wood wherever fire is a menace—that is the function of transite. For not only is this material sawed and planed with ordinary tools and fastened with nails or screws but it can be painted or varnished in remarkably true imitation of wood. Transite, in addition to its unlimited uses as a building material, is ideal for interior work where artistic fireproof effects are desired, likewise for exterior use, especially where Half Timber Stucco effects are desired.

Transite Asbestos Wood is furnished in sheets and in thicknesses from 1/8 inch to 2 inches. Ask any branch for booklet and prices.

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CONTAINING DETAILED DESCRIPTIONS OF NEW DEVICES AND APPLICATIONS OF MATERIALS WHICH ARE OF REAL VALUE IN FIRESAFE BUILDING: ALSO NOTES ON THE LATEST BOOKLETS, CATALOGS AND OTHER FIRESAFE LITERATURE, WITH OTHER ITEMS OF INTEREST TO THE FIREPROOFING FRATERNITY

LATEST EDITION

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New York City, N. Y., June, 1918

Priceless

Efficient Watch Service Needed

Concluding his report covering investigation into the destruction by fire of two large public school buildings at Philadelphia early in the present year, William McDevitt, of the Philadelphia Underwriters' Association said:

"In our long experience in investigating fires originating in school houses, occurring either during the day or night, a remarkable feature in the inquiry was the absence of the janitors when the fires were discovered, and nearly all the outbreaks would not have occurred if a watch system had been kept in the buildings, particularly during the presence of the children, a condition that demands as much, if not more, care to guard against fire or panic than are kept over adults composing theatre audiences."

Reporting upon the burned Heston and the Brooks public school buildings, which cost to erect $95,000 and $80,000 respectively. Inspector McDevitt said:

"The burned buildings were erected about 17 years ago. Each was three stories in height and they were somewhat similar in plan, being rectangular, U-shaped, the ground areas being about 11,000 square feet. Exterior walls were of granite, 24 inches thick, interior being walls of brick. Inside partitions were all of wood and plaster. Both buildings were built before the adoption of fire-resisting construction for schoolhouses. Both buildings had fire tower escapes, were heated by steam and lighted by electricity.

"The buildings had been closed some hours before the fire by the respective janitors after the fires had been banked for the night and cleaning up done, leaving the structures without any protection. The janitors, living in the vicinity of the schools, were notified of the fires in each case by passers-by who saw the evidence of fire in the buildings. The janitors proceeded to and opened the buildings, and along with others saw the fires in each case burning on the first floor. The fires spread so rapidly as to baffle any check with means at hand. The alarm was promptly given, and by the time the first complement of firemen arrived, the flames had extended throughout the interior of both structures, and each being located on the corners of large streets, and with clear space all around, afforded good draught to the fires, resulting in a complete destruction of the interior of both structures. With the Heston building the walls remained standing, but during the fire at the Brooks, while a number of firemen were directing streams into the windows of one of the fronts, a section of the wall fell out on the men, killing three outright and causing the death afterwards of two others from injuries.

"In the investigation, the steam heating apparatus located in the basement was found to be clear of all blame for the fire. The sale of Thrift Stamps had been recently introduced in all the public schools. The stack of stamps and money derived therefrom were in charge of the principals of the different schools, and it was the custom to keep the stamps and money in the principal's room. Previous to the recent fires several school buildings had been broken open (supposedly by boys), and in some cases stamps and money taken. As the fires in both burned buildings were first seen in the principal's room, it is believed that the recent fires resulted from a like motive. The intruders, being cautious not to turn on the electric lights, used matches in the search, and in their hurry caused the fires among the papers lying around."

Details illustrating the construction of fireproof floors by means of Berger Corrugated Steel Cores appear in a folder just from the press of the Berger Manufacturing Company of Canton, Ohio.

Concrete Houses for $1,000 Each

An interesting description of a series of houses to cost $1,000 which Charles H. Ingersoll, of dollar watch fame, is having built at Union, N. J., appears in the current month's issue of "Building Age."

"The shell of the house is a monolith of reinforced concrete. It is made up of outside walls, interior partitions, beams for the floors and roof, flat arches spanning between beams, chimneys, cornices and parapet.

"It is estimated that with the standard forms a house can be 'poured' in about seven hours."

D. E. Lennox, of Lawrence, N. Y., in noting the burning of numerous expensive private residences throughout Long Island in recent years, pertinently asks why our wealthy men build homes of inflammable character, fill them with expensive furniture and creations of art, and make no proper provision for their safety against fire?

Frank Woolworth, of 5 and 10 cent store fame, lost his extensive residence at Glen Cove, through fire in 1916, and had the good sense in rebuilding to use stone instead of inflammable lumber. While the initial cost in his case was much greater for the new than the old structure, the feeling of satisfaction he now experiences in knowing that the fire menace has been reduced to a minimun is worth far more than the financial outlay.

The latest contribution of the American Cement Machine Company of Keokuk, Iowa, to the building fraternity is its Boss Hyatt Bearing Concrete Cart, efficient, and considering its merits, inexpensive.

BUILD IT OF MASONRY MATERIALS

For Industrial Houses
for private homes or for any type of building to which it is adapted, careful records for the first ten years will show a **real economy** in stucco on

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In addition such construction is **fire-resistive** and gives far greater **permanence** than is offered by wood.

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Conservation

The shortage of building materials, says the "American Roofer" in many lines, the high interest rate for money, the shortage of loanable funds for non-essential undertakings, the taking of skilled men for the services and industries producing army, navy and shipping requirements, the large number of residential vacancies due to the consolidation of households traceable to the war, frequent vacancies in stores due to the draft or non-profitable small business and occasional vacancies of premises used by industries curtailed by Government control all operate to reduce the volume of new work for roofing contractors. In some localities large operations for war purposes serve to offset these shrinkages in part, but this is a temporary and feverish condition.

Conditions must be faced as they are. Roofers must for some time depend upon re-roofs and repairs on old buildings to carry the burdens of their business. The volume for many of them must fall short of the normal amount of business done year by year. This means that the expense account must be carefully watched and every unnecessary item cut out. Even when this is done, the percentage of overhead to sales is liable to run higher than has been the case for some years past.

The high unit cost of material and labor serves in some degree to reduce this percentage, but on the other hand these same costs bring about corresponding increases in the cost of wasted material and idle time which are factors to be considered in every business.

This is a period during which it will pay even better than in normal times to exercise a greater degree of supervision and do more careful planning of work.

Now is a good time for competitors to get well acquainted. When they get well enough acquainted to recognize that the good business-getter who is a poor superintendent, and the good manager of men and skilled roofer who is a slow salesman, and the efficient manager who does not know all he might about roofs, need each other badly and ought to join forces. Each must then work harder, but he will do it so much better when he is doing the work for which he is best fitted. This is an important factor in efficiency. Now is a time when, more than ever, preventable wastes are unpatriotic. The continuance of an overhead expense for a business of shrinking volume with no effort through consolidation or otherwise, to save it is a waste. The Government is fostering the get-together spirit. See the express companies. Think it over. What are you going to do about it? Do something.

Information of value to roofers is contained in a pamphlet lately issued by the American Sheet and Tin Plate Company, of Pittsburgh, and supplied freely to builders and others interested in the general subject of roofing.

English Clay Imports

A regular press bulletin of the U. S. Geological Survey on the clay imports of 1917 shows that we imported 253,831 tons of kaolin or china clay during last year at a value of $1,325,759. We imported some other clays running the total up to 317,465 tons, which is about 7 per cent. of the domestic production of clay that is marketed as clay instead of being worked directly into clay products.

The imported clay is used mainly in making paper, pottery, textiles, oilcloth, ultramarine, high grade refractories, lead pencils, enamel ware and other articles. The average price per ton of the imported clay was $5.61, compared with an average of $2.16 for domestic clay.

The imports for last year show a decrease of nearly 24,000 tons as compared to the previous year, which indicates development of our native clays to take the place of the imported. Moreover, investigations carried on by the experts of the Geological Survey indicate that the United States is or can be made practically independent or self-sustaining so far as our clay supply is concerned.

Meantime we are being told that our manufacturers are so dependent upon the imports of this English clay that ships are delayed in their return for loading with this clay, even though there is urgent need of the ships for other purposes. Commenting upon this point a special bulletin included with the regular press bulletin asks the question, Why do our manufacturers pay the high freight rates now necessary in order to obtain an article like clay from England? Then it proceeds with this explanation:

There is, as we all know, an abundance of clay in this country. A great deal of high-grade clay is produced here, and of a character suitable for pottery, porcelains and other articles which require clays of special excellence in their manufacture. But not much over half of clay of this grade that our industries require is domestic. When war broke out in 1914 only a third of it was domestic. We have not been able to develop and equip our deposits fast enough to make these English clay imports unnecessary. In fact, it is doubtful whether we will produce as much high-grade clay in 1918 as in 1917. Our manufacturers want the clay, but they cannot get anywhere near as much as they want. The reduced output is due to railroad and operating conditions and is not related to the character or size of the deposits which are capable of large production.

Domestic producers do not mine their clay quite as cleanly as their English competitors. Nor is the domestic clay as uniform in character. It will not bring the high prices paid for English clay. But more could be sold if it could be produced and carried to its market. Still more could be marketed if cleaner, more uniform clay were produced, for in that event the consumers would use a greater percentage of domestic and correspondingly less English clay in their mixtures.

However, our complete dependence upon English clay continues. We must rely on English clay as a chief ingredient of the dishes we eat from, the paper in our books and magazines, the porcelain in our electric light sockets and a half a dozen other articles of less general use.

Fortunately it is a fact that far less English clay is necessary to proper manufacture of paper than is now used. Besides domestic clay there are many other substances of domestic origin that could be used in the body, not the finish of this paper. Also over half of the English clay we use is consumed in making paper. So that if a shortage of English clay should develop it would not be highly serious until the shortage became very great, until there was only a half of the normal supply or less available.

Decide Upon Brick Construction

Brick will be the material used by the Bridgeport Housing Company of Bridgeport, Conn., in the erection of the industrial homes it was authorized to build for use of workers upon Government contracts.

What is reported to be the largest public building in course of erection in California is that intended for the State Agricultural exhibit at the Sacramento fair grounds. In its erection 500,000 face brick will be used, and a liberal quantity of terra cotta.

Following the death of Harry S. Fate, directors of the J. D. Fate Company of Portsmouth, Ohio, elected John A. Root president of the corporation, Charles E. Heath vice-president and Harry Reginald Siks secretary.

Views of ceilings covered with its product are shown in a folder issued by the Milwaukee Corrugating Company, of Milwaukee. The company has popularized the use of metal ceilings throughout its territory, and the demand for its product steadily increases.

The Bishop-Babcock-Becker Co. of Cleveland, O., has secured control of the Consolidated Engineering Co., Chicago, Ill., manufacturer of the Van Auken system of vacuum heating, Kinealy air washers and the Thermograde modulation system of heating, as well as of the Massachusetts fans, with plants in Chicago and Watertown, Mass.

National War Savings Day June 28th

That's the day we sign up.

That's the day we tell Uncle Sam just how hard we want to win this war. That's the day our government has officially set for us to purchase War Savings Stamps.

On June 28th every man, woman and child in the United States will be called upon to pledge his or her full quota of War Savings Stamp purchases for 1918.

You will be expected to pledge the **full** amount that you can afford—no more—but by the same token, no less.

In every state, county, city, town and village the War Savings Committees are preparing for this big patriotic rally of June 28th. Unless you have already bought War Savings Stamps to the $1,000 limit, get busy with paper and pencil and figure out the **utmost** you can do.

Remember this. You take no chances when you go the limit on War Savings Stamps. They are the best and safest investment in the world. They pay you 4% interest compounded quarterly. They **can't** go below par. You can get back every dollar you put into War Savings Stamps **any time you need it.** You can turn them in at the Post Office **any time** for their full value plus interest.

Uncle Sam is asking hundreds of thousands of men to **give** their lives to their country. He is asking you only to **lend** your money.

What are **you** lending?

National War Savings Committee, Washington.

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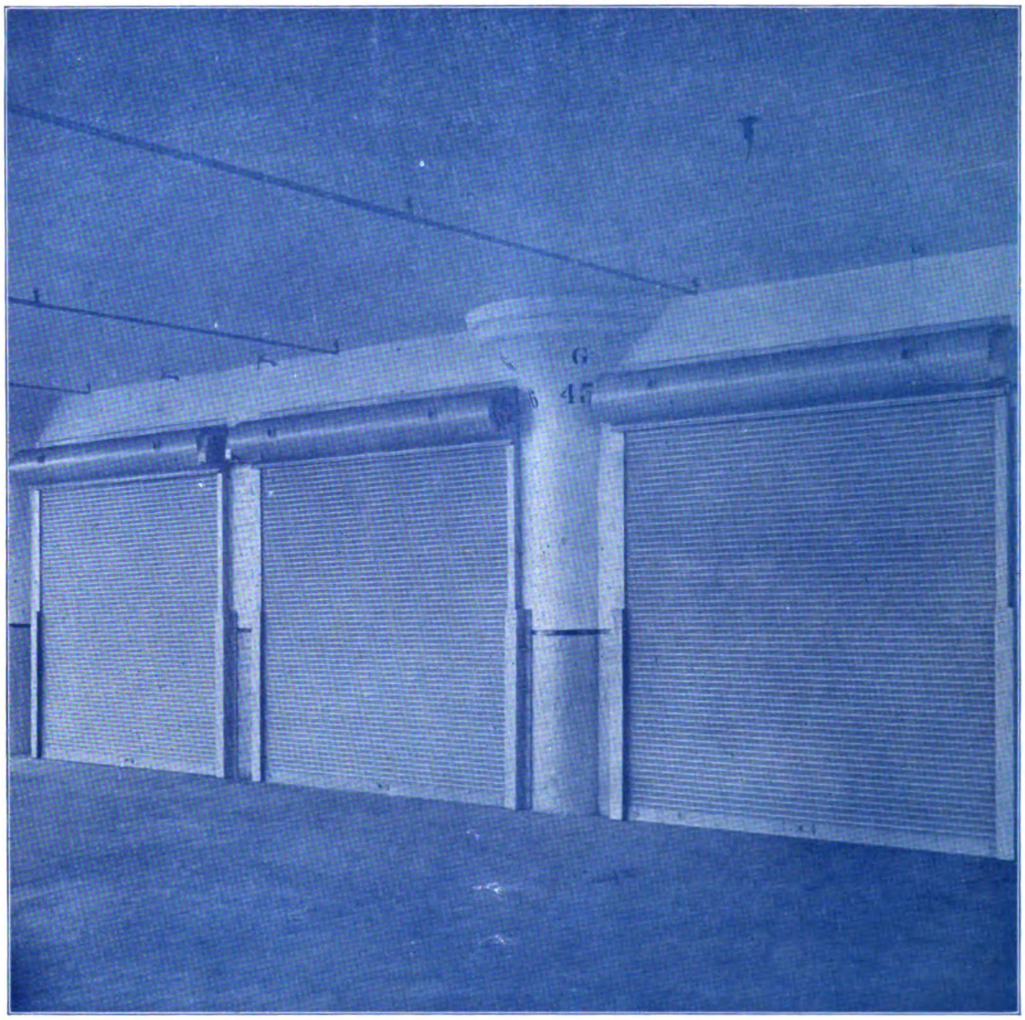
JUNE 1918

VOLUME SIX NUMBER SIX

A JOURNAL FOR ARCHITECTS, PROPERTY-OWNERS, CONTRACTORS, BUILDERS, UNDERWRITERS, FIRE PREVENTION ENGINEERS AND CITY OFFICIALS



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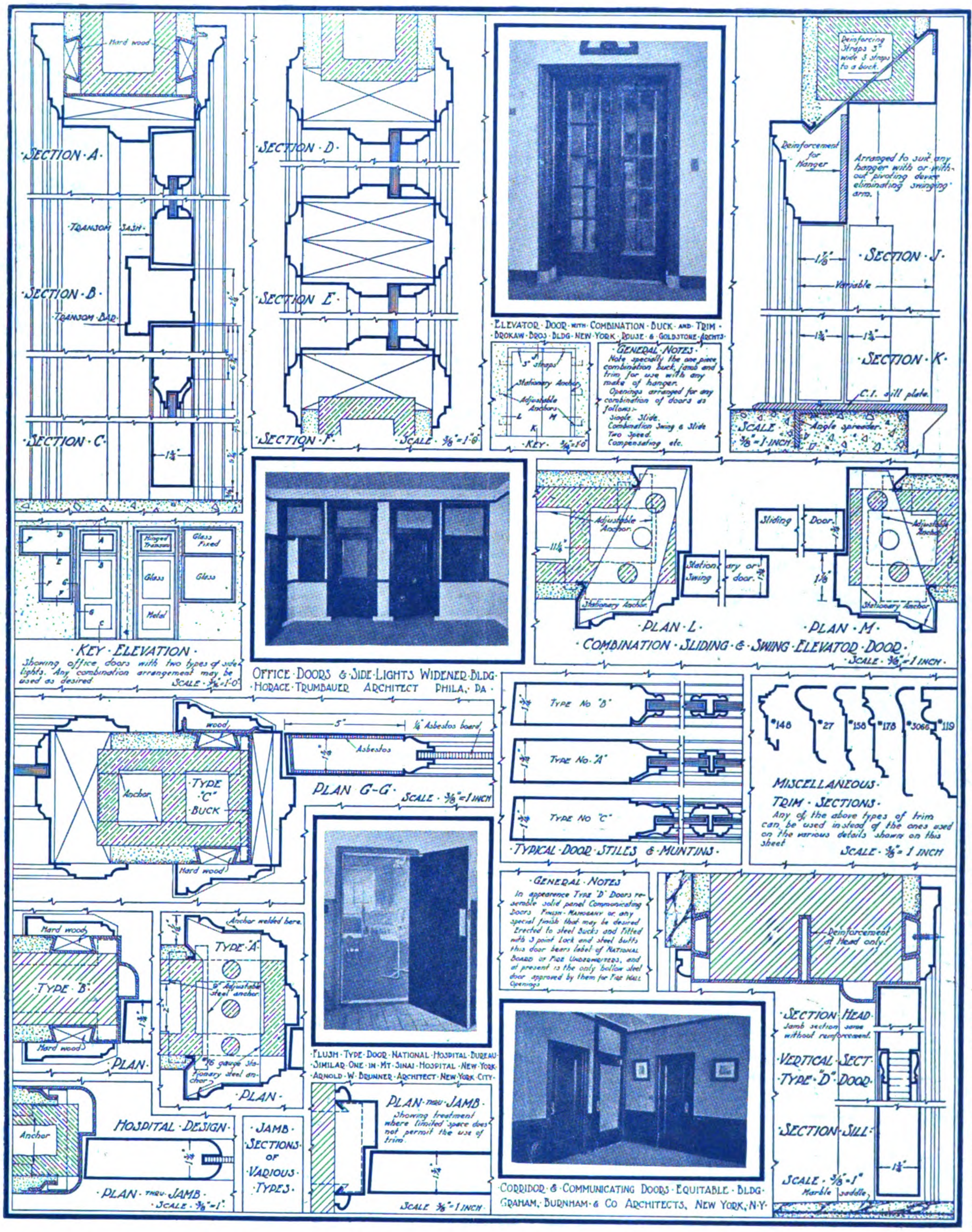

ELEVATOR DOOR WITH COMBINATION BUCK AND TRIM BROKAW BROS BLDG NEW YORK ROUSE & GOLDSTONE ARCHTS

GENERAL NOTES
Note specially the one piece combination buck, jamb and trim for use with any make of hanger.
Openings arranged for any combination of doors as follows:–
Single Slide.
Combination Swing & Slide
Two Speed.
Compensating etc.

KEY ELEVATION
Showing office doors with two types of side lights. Any combination arrangement may be used as desired
SCALE 3/16"=1'-0"

OFFICE DOORS & SIDE LIGHTS WIDENER BLDG HORACE TRUMBAUER ARCHITECT PHILA, PA

COMBINATION SLIDING & SWING ELEVATOR DOOR
SCALE 3/8"=1 INCH

TYPICAL DOOR STILES & MUNTINS

MISCELLANEOUS TRIM SECTIONS
Any of the above types of trim can be used instead of the ones used on the various details shown on this sheet
SCALE 3/8"=1 INCH

GENERAL NOTES
In appearence Type "D" Doors resemble solid panel Communicating Doors Finish–Mahogany or any special finish that may be desired Erected to steel Bucks and Fitted with 3 point Lock and steel butts this door bears label of National Board of Fire Underwriters, and at present is the only hollow steel door approved by them for Fire Wall Openings

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PLAN THRU JAMB
Showing treatment where limited space does not permit the use of trim
SCALE 3/8"=1 INCH

CORRIDOR & COMMUNICATING DOORS EQUITABLE BLDG GRAHAM, BURNHAM & CO ARCHITECTS, NEW YORK, N.Y.

EMPIRE ART METAL COMPANY

COLLEGE POINT NEW YORK U. S. A.

It's past saving now—But that fire was small at the start and easily extinguished had the property been wisely protected by Globe Automatic Sprinklers. ¶ Some day fire may strike your property. And perhaps you, too, will pay the full penalty of negligence. ¶ Globe Sprinklers will watch over your property, paying for themselves out of the insurance savings they effect. Write for details.

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